

SEQUENCE LISTING

<110> ISIS INNOVATION LIMITED

<120> HYDROGEN PEROXIDE OXIDATION

<130> N.91079A SA

<160> 36

<170> PatentIn version 3.2

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<211> 1248

<212> DNA

<213> Pseudomonas putida

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<221> CDS

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tcg aat ctg tct gcc ggc gtg cag gag gcc tgg gca gtt ctg caa gaa	144
Ser Asn Leu Ser Ala Gly Val Gln Glu Ala Trp Ala Val Leu Gln Glu	
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tca aac gta ccg gat ctg gtg tgg act cgc tgc aac ggc gga cac tgg	192
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Ile Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg	
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cac ttt tcc agc gag tgc ccg ttc atc cct cgt gaa gcc ggc gaa gcc	288
His Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala	
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Tyr Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe	
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cgt gcg ctg gcc aac caa gtg gtt ggc atg ccg gtg gtg gat aag ctg	384
Arg Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu	
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gag aac cgg atc cag gag ctg gcc tgc tcg ctg atc gag agc ctg cgc	432
Glu Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg	
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Ile Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro	
165 170 175	

cac ttg aaa tac cta acg gat cag atg acc cgt ccg gat ggc agc atg	576
His Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met	
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Thr Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile	
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agg atg tgt ggc ctg tta ctg gtc ggc ctg gat acg gtg gtc aat 768
 Arg Met Cys Gly Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn
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 Phe Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg
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cag gag ctg atc gag cgt ccc gag cgt att cca gcc gct tgc gag gaa 864
 Gln Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu
 275 280 285

cta ctc cgg cgc ttc tcg ctg gtt gcc gat ggc cgc atc ctc acc tcc 912
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 Asp Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu
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atg cac gtc gac ttc agt cgc caa aag gtt tca cac acc acc ttt ggc 1056
 Met His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly
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cac ggc agc cat ctg tgc ctt ggc cag cac ctg gcc cgc cgg gaa atc 1104
 His Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile
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atc gtc acc ctc aag gaa tgg ctg acc agg att cct gac ttc tcc att 1152
 Ile Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile
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Ser Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp
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Ile Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg
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His Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala
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Tyr Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe
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 His Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met
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 Phe Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg
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 Gln Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu
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 Asp Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu
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 His Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile
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Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys Ile Ala Asp Glu Leu			
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gga gaa atc ttt aaa ttc gag gcg cct ggt cgt gta acg cgc tac tta	1699		
Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg Val Thr Arg Tyr Leu			
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Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp Glu Ser Arg Phe Asp			
55	60	65	
aaa aac tta agt caa gcg ctt aaa ttt gta cgt gat ttt gca gga gac	1795		
Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg Asp Phe Ala Gly Asp			
70	75	80	85
ggg tta ttt aca agc tgg acg cat gaa aaa aat tgg aaa aaa gcg cat	1843		
Gly Leu Phe Thr Ser Trp Thr His Glu Lys Asn Trp Lys Lys Ala His			
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aat atc tta ctt cca agc ttc agt cag cag gca atg aaa ggc tat cat	1891		

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Ala Met Met Val Asp Ile Ala Val Gln Leu Val Gln Lys Trp Glu Arg			
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Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu Asp Met Thr Arg Leu			
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Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn Tyr Arg Phe Asn Ser			
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Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr Ser Met Val Arg Ala			
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Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala Asn Pro Asp Asp Pro			
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gct tat gat gaa aac aag cgc cag ttt caa gaa gat atc aag gtg atg		2179	
Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu Asp Ile Lys Val Met			
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215	220	225	
caa agc gat gat tta tta acg cat atg cta aac gga aaa gat cca gaa		2275	
Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn Gly Lys Asp Pro Glu			
230	235	240	245
acg ggt gag ccg ctt gat gac gag aac att cgc tat caa att att aca		2323	
Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg Tyr Gln Ile Ile Thr			
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Phe Leu Ile Ala Gly His Glu Thr Ser Gly Leu Leu Ser Phe Ala			
265	270	275	
ctg tat ttc tta gtg aaa aat cca cat gta tta caa aaa gca gca gaa		2419	
Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu Gln Lys Ala Ala Glu			
280	285	290	
gaa gca gca cga gtt cta gta gat cct gtt cca agc tac aaa caa gtc		2467	
Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro Ser Tyr Lys Gln Val			
295	300	305	
aaa cag ctt aaa tat gtc ggc atg gtc tta aac gaa gcg ctg cgc tta		2515	
Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn Glu Ala Leu Arg Leu			
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tgg cca act gct cct gcg ttt tcc cta tat gca aaa gaa gat acg gtg		2563	
Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala Lys Glu Asp Thr Val			
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ctt gga gga gaa tat cct tta gaa aaa ggc gac gaa cta atg gtt ctg		2611	
Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp Glu Leu Met Val Leu			
345	350	355	
att cct cag ctt cac cgt gat aaa aca att tgg gga gac gat gtg gaa		2659	
Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp Gly Asp Asp Val Glu			
360	365	370	
gag ttc cgt cca gag cgt ttt gaa aat cca agt gcg att ccg cag cat		2707	
Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser Ala Ile Pro Gln His			
375	380	385	
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Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala Cys Ile Gly Gln Gln			
390	395	400	405
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Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly Met Met Leu Lys His		
410	415	420
ttt gac ttt gaa gat cat aca aac tac gag ctg gat att aaa gaa act		2851
Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu Asp Ile Lys Glu Thr		
425	430	435
tta acg tta aaa cct gaa ggc ttt gtg gta aaa gca aaa tcg aaa aaa		2899
Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys Ala Lys Ser Lys Lys		
440	445	450
att ccg ctt ggc ggt att cct tca cct agc act gaa cag tct gct aaa		2947
Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr Glu Gln Ser Ala Lys		
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Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn Thr Pro Leu Leu Val		
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Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly Thr Ala Arg Asp Leu		
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gca gat att gca atg agc aaa gga ttt gca ccg cag gtc gca acg ctt		3091
Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro Gln Val Ala Thr Leu		
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Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly Ala Val Leu Ile Val		
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Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn Ala Lys Gln Phe Val		
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gac tgg tta gac caa gcg tct gct gat gaa gta aaa ggc gtt cgc tac		3235
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Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala Thr Thr Tyr Gln Lys		
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gtg cct gct ttt atc gat gaa acg ctt gcc gct aaa ggg gca gaa aac		3331
Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala Lys Gly Ala Glu Asn		
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Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp Asp Phe Glu Gly Thr		
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Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp Val Ala Ala Tyr Phe		
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Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys Ser Thr Leu Ser Leu		
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caa ttt gtc gac agc gcc gcg gat atg ccg ctt gcg aaa atg cac ggt		3523
Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu Ala Lys Met His Gly		
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gcg ttt tca acg aac gtc gta gca agc aaa gaa ctt caa cag cca ggc		3571
Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu Leu Gln Gln Pro Gly		
665	670	675
agt gca cga agc acg cga cat ctt gaa att gaa ctt cca aaa gaa gct		3619
Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu Leu Pro Lys Glu Ala		
680	685	690
tct tat caa gaa gga gat cat tta ggt gtt att cct cgc aac tat gaa		3667
Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile Pro Arg Asn Tyr Glu		
695	700	705
gga ata gta aac cgt gta aca gca agg ttc ggc cta gat gca tca cag		3715

Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly Leu Asp Ala Ser Gln	710	715	720	725	
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Gln Ile Arg Leu Glu Ala Glu Glu Lys Leu Ala His Leu Pro Leu	730	735	740		
gct aaa aca gta tcc gta gaa gag ctt ctg caa tac gtg gag ctt caa					3811
Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln Tyr Val Glu Leu Gln	745	750	755		
gat cct gtt acg cgc acg cag ctt cgc gca atg gct gct aaa acg gtc					3859
Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met Ala Ala Lys Thr Val	760	765	770		
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Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu Leu Glu Lys Gln Ala	775	780	785		
tac aaa gaa caa gtg ctg gca aaa cgt tta aca atg ctt gaa ctg ctt					3955
Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr Met Leu Glu Leu Leu	790	795	800	805	
gaa aaa tac ccg gcg tgt gaa atg aaa ttc agc gaa ttt atc gcc ctt					4003
Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser Glu Phe Ile Ala Leu	810	815	820		
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Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Arg	825	830	835		
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Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser Val Val Ser Gly Glu	840	845	850		
gcg tgg agc gga tat gga gaa tat aaa gga att gcg tcg aac tat ctt					4147
Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile Ala Ser Asn Tyr Leu	855	860	865		
gcc gag ctg caa gaa gga gat acg att acg tgc ttt att tcc aca ccg					4195
Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys Phe Ile Ser Thr Pro	870	875	880	885	
cag tca gaa ttt acg ctg cca aaa gac cct gaa acg ccg ctt atc atg					4243
Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu Thr Pro Leu Ile Met	890	895	900		
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Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly Phe Val Gln Ala	905	910	915		
cgc aaa cag cta aaa gaa caa gga cag tca ctt gga gaa gca cat tta					4339
Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu Gly Glu Ala His Leu	920	925	930		
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Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val Gln His Val Met Glu	970	975	980		
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Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp Gln Gly Ala His Phe	985	990	995		
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Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro Ala Val Glu Ala	1000	1005	1010		
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Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val Ser Glu Ala
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Asn Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys
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Ile Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg
 35 40 45

Val Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp
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Glu Ser Arg Phe Asp Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg
 65 70 75 80

Asp Phe Ala Gly Asp Gly Leu Phe Thr Ser Trp Thr His Glu Lys Asn
 85 90 95

Trp Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala
 100 105 110

Met Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val
 115 120 125

Gln Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu
 130 135 140

Asp Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn
 145 150 155 160

Tyr Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr
 165 170 175

Ser Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala
 180 185 190

Asn Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu
 195 200 205

Asp Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg
 210 215 220

Lys Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn
 225 230 235 240

Gly Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg
 245 250 255

Tyr Gln Ile Ile Thr Phe Leu Ile Ala Gly His Glu Thr Thr Ser Gly
 260 265 270
 Leu Leu Ser Phe Ala Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu
 275 280 285
 Gln Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro
 290 295 300
 Ser Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn
 305 310 315 320
 Glu Ala Leu Arg Leu Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala
 325 330 335
 Lys Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp
 340 345 350
 Glu Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp
 355 360 365
 Gly Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser
 370 375 380
 Ala Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala
 385 390 395 400
 Cys Ile Gly Gln Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly
 405 410 415
 Met Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu
 420 425 430
 Asp Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys
 435 440 445
 Ala Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr
 450 455 460
 Glu Gln Ser Ala Lys Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn
 465 470 475 480
 Thr Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly
 485 490 495
 Thr Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro
 500 505 510
 Gln Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly
 515 520 525
 Ala Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn
 530 535 540
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 545 550 555 560
 Lys Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala
 565 570 575
 Thr Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala
 580 585 590
 Lys Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp
 595 600 605
 Asp Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp
 610 615 620
 Val Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys
 625 630 635 640
 Ser Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu
 645 650 655
 Ala Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu

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675	680	685
Leu Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile		
690	695	700
Pro Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly		
705	710	715
720		
Leu Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Lys Leu		
725	730	735
Ala His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln		
740	745	750
Tyr Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met		
755	760	765
Ala Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu		
770	775	780
Leu Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr		
785	790	795
800		
Met Leu Glu Leu Leu Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser		
805	810	815
Glu Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile		
820	825	830
Ser Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser		
835	840	845
Val Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile		
850	855	860
Ala Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys		
865	870	875
880		
Phe Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu		
885	890	895
Thr Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg		
900	905	910
Gly Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu		
915	920	925
Gly Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr		
930	935	940
Leu Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr		
945	950	955
960		
Leu His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val		
965	970	975
Gln His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp		
980	985	990
Gln Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro		
995	1000	1005
Ala Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln		
1010	1015	1020
Val Ser Glu Ala Asp Ala Arg Leu Trp Leu Gln Gln Leu Glu Glu		
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 <213> Artificial sequence

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tta ccg tta tta aac aca gat aaa ccg gtt caa gct ttg atg aaa att	96
Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys Ile	
20 25 30	
gcg gat gaa tta gga gaa atc ttt aaa ttc gag gcg cct ggt cgt gta	144
Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg Val	
35 40 45	
acg cgc tac tta tca agt cag cgt cta att aaa gaa gca tgc gat gaa	192
Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp Glu	
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tca cgc ttt gat aaa aac tta agt caa gcg ctt aaa ttt gta cgt gat	240
Ser Arg Phe Asp Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg Asp	
65 70 75 80	
ttt gca gga gac ggg tta gct aca agc tgg acg cat gaa aaa aat tgg	288
Phe Ala Gly Asp Gly Leu Ala Thr Ser Trp Thr His Glu Lys Asn Trp	
85 90 95	
aaa aaa gcg cat aat atc tta ctt cca agc ttc agt cag cag gca atg	336
Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala Met	
100 105 110	
aaa ggc tat cat gcg atg atg gtc gat atc gcc gtg cag ctt gtt caa	384
Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val Gln	
115 120 125	
aag tgg gag cgt cta aat gca gat gag cat att gaa gta ccg gaa gac	432
Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu Asp	
130 135 140	
atg aca cgt tta acg ctt gat aca att ggt ctt tgc ggc ttt aac tat	480
Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn Tyr	
145 150 155 160	
cgc ttt aac agc ttt tac cga gat cag cct cat cca ttt att aca agt	528
Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr Ser	
165 170 175	
atg gtc cgt gca ctg gat gaa gca atg aac aag ctg cag cga gca aat	576
Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala Asn	
180 185 190	
cca gac gac cca gct tat gat gaa aac aag cgc cag ttt caa gaa gat	624
Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu Asp	
195 200 205	
atc aag gtg atg aac gac cta gta gat aaa att att gca gat cgc aaa	672
Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg Lys	
210 215 220	
gca agc ggt gaa caa agc gat gat tta tta acg cat atg cta aac gga	720
Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn Gly	
225 230 235 240	
aaa gat cca gaa acg ggt gag ccg ctt gat gac gag aac att cgc tat	768
Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg Tyr	

245	250	255	
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aaa gca gca gaa gaa gca gca cga gtt cta gta gat cct gtt cca agc Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro Ser 290	295	300	912
tac aaa caa gtc aaa cag ctt aaa tat gtc ggc atg gtc tta aac gaa Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn Glu 305	310	315	960
gcg ctg cgc tta tgg cca act gct cct gcg ttt tcc cta tat gca aaa Ala Leu Arg Leu Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala Lys 325	330	335	1008
gaa gat acg gtg ctt gga gga gaa tat cct tta gaa aaa ggc gac gaa Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp Glu 340	345	350	1056
cta atg gtt ctg att cct cag ctt cac cgt gat aaa aca att tgg gga Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp Gly 355	360	365	1104
gac gat gtg gaa gag ttc cgt cca gag cgt ttt gaa aat cca agt gcg Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser Ala 370	375	380	1152
att ccg cag cat gcg ttt aaa ccg ttt gga aac ggt cag cgt gcg tgt Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala Cys 385	390	395	1200
atc ggt cag cag ttc gct ctt cat gaa gca acg ctg gta ctt ggt atg Ile Gly Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly Met 405	410	415	1248
atg cta aaa cac ttt gac ttt gaa gat cat aca aac tac gag ctg gat Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu Asp 420	425	430	1296
att aaa gaa act tta acg tta aaa cct gaa ggc ttt gtg gta aaa gca Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys Ala 435	440	445	1344
aaa tcg aaa aaa att ccg ctt ggc ggt att cct tca cct agc act gaa Lys Ser Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr Glu 450	455	460	1392
cag tct gct aaa aaa gta cgc aaa aag gca gaa aac gct cat aat acg Gln Ser Ala Lys Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn Thr 465	470	475	1440
ccg ctg ctt gtg cta tac ggt tca aat atg gga aca gct gaa gga acg Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly Thr 485	490	495	1488
gcg cgt gat tta gca gat att gca atg agc aaa gga ttt gca ccg cag Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro Gln 500	505	510	1536
gtc gca acg ctt gat tca cac gcc gga aat ctt ccg cgc gaa gga gct Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly Ala 515	520	525	1584
gta tta att gta acg gcg tct tat aac ggt cat ccg cct gat aac gca Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn Ala 530	535	540	1632
aag caa ttt gtc gac tgg tta gac caa gcg tct gct gat gaa gta aaa Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val Lys			1680

545	550	555	560	
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acg tat caa aaa gtg cct gct ttt atc gat gaa acg ctt gcc gct aaa Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala Lys 580 585 590				1776
ggg gca gaa aac atc gct gac cgc ggt gaa gca gat gca agc gac gac Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp Asp 595 600 605				1824
ttt gaa ggc aca tat gaa gaa tgg cgt gaa cat atg tgg agt gac gta Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp Val 610 615 620				1872
gca gcc tac ttt aac ctc gac att gaa aac agt gaa gat aat aaa tct Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys Ser 625 630 635 640				1920
act ctt tca ctt caa ttt gtc gac agc gcc gcg gat atg ccg ctt gcg Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu Ala 645 650 655				1968
aaa atg cac ggt gcg ttt tca acg aac gtc gta gca agc aaa gaa ctt Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu Leu 660 665 670				2016
caa cag cca ggc agt gca cga agc acg cga cat ctt gaa att gaa ctt Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu Leu 675 680 685				2064
cca aaa gaa gct tct tat caa gaa gga gat cat tta ggt gtt att cct Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile Pro 690 695 700				2112
cgc aac tat gaa gga ata gta aac cgt gta aca gca agg ttc ggc cta Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly Leu 705 710 715 720				2160
gat gca tca cag caa atc cgt ctg gaa gca gaa gaa gaa aaa tta gct Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Glu Lys Leu Ala 725 730 735				2208
cat ttg cca ctc gct aaa aca gta tcc gta gaa gag ctt ctg caa tac His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln Tyr 740 745 750				2256
gtg gag ctt caa gat cct gtt acg cgc acg cag ctt cgc gca atg gct Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met Ala 755 760 765				2304
gct aaa acg gtc tgc ccg ccg cat aaa gta gag ctt gaa gcc ttg ctt Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu Leu 770 775 780				2352
gaa aag caa gcc tac aaa gaa caa gtg ctg gca aaa cgt tta aca atg Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr Met 785 790 795 800				2400
ctt gaa ctg ctt gaa aaa tac ccg gcg tgt gaa atg aaa ttc agc gaa Leu Glu Leu Leu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser Glu 805 810 815				2448
ttt atc gcc ctt ctg cca agc ata cgc ccg cgc tat tac tcg att tct Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile Ser 820 825 830				2496
tca tca cct cgt gtc gat gaa aaa caa gca agc atc acg gtc agc gtt Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser Val 835 840 845				2544
gtc tca gga gaa gcg tgg agc gga tat gga gaa tat aaa gga att gcg Val Ser Gly Glu Ala Trp Ser Gly Tyr Glu Tyr Lys Gly Ile Ala				2592

850	855	860	
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att tcc aca ccg cag tca gaa ttt acg ctg cca aaa gac cct gaa acg Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu Thr			
885	890	895	
ccg ctt atc atg gtc gga ccg gga aca ggc gtc gcg ccg ttt aga ggc Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly			
900	905	910	
ttt gtg cag gcg cgc aaa cag cta aaa gaa caa gga cag tca ctt gga Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu Gly			
915	920	925	
gaa gca cat tta tac ttc ggc tgc cgt tca cct cat gaa gac tat ctg Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr Leu			
930	935	940	
tat caa gaa gag ctt gaa aac gcc caa agc gaa ggc atc att acg ctt Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr Leu			
945	950	955	960
cat acc gct ttt tct cgc atg cca aat cag ccg aaa aca tac gtt cag His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val Gln			
965	970	975	
cac gta atg gaa caa gac ggc aag aaa ttg att gaa ctt ctt gat caa His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp Gln			
980	985	990	
gga gcg cac ttc tat att tgc gga gac gga agc caa atg gca cct gcc Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro Ala			
995	1000	1005	
gtt gaa gca acg ctt atg aaa agc tat gct gac gtt cac caa gtg Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val			
1010	1015	1020	
agt gaa gca gac gct cgc tta tgg ctg cag cag cta gaa gaa aaa Ser Glu Ala Asp Ala Arg Leu Trp Leu Gln Gln Leu Glu Glu Lys			
1025	1030	1035	
ggc cga tac gca aaa gac gtg tgg gct ggg taa Gly Arg Tyr Ala Lys Asp Val Trp Ala Gly			
1040	1045		

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<220>
 <223> Cytochrome P450BM-3 mutant

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Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg Val
35 40 45

Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp Glu
50 55 60

Ser Arg Phe Asp Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg Asp
65 70 75 80

Phe Ala Gly Asp Gly Leu Ala Thr Ser Trp Thr His Glu Lys Asn Trp
 85 90 95
 Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala Met
 100 105 110
 Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val Gln
 115 120 125
 Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu Asp
 130 135 140
 Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn Tyr
 145 150 155 160
 Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr Ser
 165 170 175
 Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala Asn
 180 185 190
 Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu Asp
 195 200 205
 Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg Lys
 210 215 220
 Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn Gly
 225 230 235 240
 Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg Tyr
 245 250 255
 Gln Ile Ile Thr Phe Leu Ile Ala Gly His Glu Thr Thr Ser Gly Leu
 260 265 270
 Leu Ser Phe Ala Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu Gln
 275 280 285
 Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro Ser
 290 295 300
 Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn Glu
 305 310 315 320
 Ala Leu Arg Leu Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala Lys
 325 330 335
 Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp Glu
 340 345 350
 Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp Gly
 355 360 365
 Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser Ala
 370 375 380
 Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala Cys
 385 390 395 400
 Ile Gly Gln Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly Met
 405 410 415
 Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu Asp
 420 425 430
 Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys Ala
 435 440 445
 Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr Glu
 450 455 460
 Gln Ser Ala Lys Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn Thr
 465 470 475 480
 Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly Thr

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Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly Ala		
515	520	525
Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn Ala		
530	535	540
Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val Lys		
545	550	555
Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala Thr		
565	570	575
Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala Lys		
580	585	590
Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp Asp		
595	600	605
Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp Val		
610	615	620
Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys Ser		
625	630	635
Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu Ala		
645	650	655
Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu Leu		
660	665	670
Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu Leu		
675	680	685
Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile Pro		
690	695	700
Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly Leu		
705	710	715
720		
Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Lys Leu Ala		
725	730	735
His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln Tyr		
740	745	750
Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met Ala		
755	760	765
Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu Leu		
770	775	780
Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr Met		
785	790	795
800		
Leu Glu Leu Leu Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser Glu		
805	810	815
Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile Ser		
820	825	830
Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser Val		
835	840	845
Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile Ala		
850	855	860
Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys Phe		
865	870	875
880		
Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu Thr		
885	890	895

Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly
 900 905 910
 Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu Gly
 915 920 925
 Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr Leu
 930 935 940
 Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr Leu
 945 950 955 960
 His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val Gln
 965 970 975
 His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp Gln
 980 985 990
 Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro Ala
 995 1000 1005
 Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val
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 <223> Cytochrome P450BM-3 mutant

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 Thr Ile Lys Glu Met Pro Gln Pro Lys Thr Phe Gly Glu Leu Lys Asn
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 tta ccg tta tta aac aca gat aaa ccg gtt caa gct ttg atg aaa att 96
 Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys Ile
 20 25 30
 gcg gat gaa tta gga gaa atc ttt aaa ttc gag gcg cct ggt cgt gta 144
 Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg Val
 35 40 45
 acg cgc tac tta tca agt cag cgt cta att aaa gaa gca tgc gat gaa 192
 Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp Glu
 50 55 60
 tca cgc ttt gat aaa aac tta agt caa ggg ctt aaa ttt gta cgt gat 240
 Ser Arg Phe Asp Lys Asn Leu Ser Gln Gly Leu Lys Phe Val Arg Asp
 65 70 75 80
 ttt gca gga gac ggg tta gtt aca agc tgg acg cat gaa aaa aat tgg 288
 Phe Ala Gly Asp Gly Leu Val Thr Ser Trp Thr His Glu Lys Asn Trp
 85 90 95
 aaa aaa gcg cat aat atc tta ctt cca agc ttc agt cag cag gca atg 336
 Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala Met
 100 105 110
 aaa ggc tat cat gcg atg atg gtc gat atc gcc gtg cag ctt gtt caa 384

Lys	Gly	Tyr	His	Ala	Met	Met	Val	Asp	Ile	Ala	Val	Gln	Leu	Val	Gln	
115							120						125			
aag	tgg	gag	cgt	cta	aat	gca	gat	gag	cat	att	gaa	gta	ccg	gaa	gac	432
Lys	Trp	Glu	Arg	Leu	Asn	Ala	Asp	Glu	His	Ile	Glu	Val	Pro	Glu	Asp	
130							135						140			
atg	aca	cgt	tta	acg	ctt	gat	aca	att	ggt	ctt	tgc	ggc	ttt	aac	tat	480
Met	Thr	Arg	Leu	Thr	Leu	Asp	Thr	Ile	Gly	Leu	Cys	Gly	Phe	Asn	Tyr	
145							150						155			160
cgc	ttt	aac	agc	ttt	tac	cga	gat	cag	cct	cat	cca	ttt	att	aca	agt	528
Arg	Phe	Asn	Ser	Phe	Tyr	Arg	Asp	Gln	Pro	His	Pro	Phe	Ile	Thr	Ser	
165							170						175			
atg	gtc	cgt	gca	ctg	gat	gaa	gca	atg	aac	aag	cag	cag	cga	gca	aat	576
Met	Val	Arg	Ala	Leu	Asp	Glu	Ala	Met	Asn	Lys	Gln	Gln	Arg	Ala	Asn	
180							185						190			
cca	gac	gac	cca	gct	tat	gat	gaa	aac	aag	cgc	cag	ttt	caa	gaa	gat	624
Pro	Asp	Asp	Pro	Ala	Tyr	Asp	Glu	Asn	Lys	Arg	Gln	Phe	Gln	Glu	Asp	
195							200						205			
atc	aag	gtg	atg	aac	gac	cta	gta	gat	aaa	att	att	gca	gat	cgc	aaa	672
Ile	Lys	Val	Met	Asn	Asp	Leu	Val	Asp	Lys	Ile	Ile	Ala	Asp	Arg	Lys	
210							215						220			
gca	agc	ggt	gaa	caa	agc	gat	gat	tta	tta	acg	cat	atg	cta	aac	gga	720
Ala	Ser	Gly	Glu	Gln	Ser	Asp	Asp	Leu	Leu	Thr	His	Met	Leu	Asn	Gly	
225							230						235			240
aaa	gat	cca	gaa	acg	ggt	gag	ccg	ctt	gat	gac	gag	aac	att	cgc	tat	768
Lys	Asp	Pro	Glu	Thr	Gly	Glu	Pro	Leu	Asp	Asp	Glu	Asn	Ile	Arg	Tyr	
245							250						255			
caa	att	att	aca	tcc	tta	att	gcg	gga	cac	gaa	aca	aca	agt	ggt	ctt	816
Gln	Ile	Ile	Thr	Phe	Leu	Ile	Ala	Gly	His	Glu	Thr	Thr	Ser	Gly	Leu	
260							265						270			
tta	tca	ttt	gcg	ctg	tat	ttc	tta	gtg	aaa	aat	cca	cat	gta	tta	caa	864
Ieu	Ser	Phe	Ala	Leu	Tyr	Phe	Leu	Val	Lys	Asn	Pro	His	Val	Ieu	Gln	
275							280						285			
aaa	gca	gca	gaa	gca	gca	cga	gtt	cta	gta	gat	cct	gtt	cca	agc	912	
Lys	Ala	Ala	Glu	Glu	Ala	Ala	Arg	Val	Leu	Val	Asp	Pro	Val	Pro	Ser	
290							295						300			
tac	aaa	caa	gtc	aaa	cag	ctt	aaa	tat	gtc	ggc	atg	gtc	tta	aac	gaa	960
Tyr	Lys	Gln	Val	Lys	Gln	Leu	Lys	Tyr	Val	Gly	Met	Val	Leu	Asn	Glu	
305							310						315			320
gcg	ctg	cgc	tta	tgg	cca	act	gct	cct	gcg	ttt	tcc	cta	tat	gca	aaa	1008
Ala	Leu	Arg	Leu	Trp	Pro	Thr	Ala	Pro	Ala	Phe	Ser	Leu	Tyr	Ala	Lys	
325							330						335			
gaa	gat	acg	gtg	ctt	gga	gga	gaa	tat	cct	tta	gaa	aaa	ggc	gac	gaa	1056
Glu	Asp	Thr	Val	Leu	Gly	Gly	Glu	Tyr	Pro	Leu	Glu	Lys	Gly	Asp	Glu	
340							345						350			
cta	atg	gtt	ctg	att	cct	cag	ctt	cac	cgt	gat	aaa	aca	att	tgg	gga	1104
Leu	Met	Val	Ieu	Ile	Pro	Gln	Ieu	His	Arg	Asp	Lys	Thr	Ile	Trp	Gly	
355							360						365			
gac	gat	gtg	gaa	gag	ttc	cgt	cca	gag	cgt	ttt	gaa	aat	cca	agt	gcg	1152
Asp	Asp	Val	Glu	Glu	Phe	Arg	Pro	Glu	Arg	Phe	Glu	Asn	Pro	Ser	Ala	
370							375						380			
att	ccg	cag	cat	gcg	ttt	aaa	ccg	ttt	gga	aac	ggt	cag	cgt	gcg	tgt	1200
Ile	Pro	Gln	His	Ala	Phe	Lys	Pro	Phe	Gly	Asn	Gly	Gln	Arg	Ala	Cys	
385							390						395			400
atc	ggt	cag	cag	ttc	gct	ctt	cat	gaa	gca	acg	ctg	gta	ctt	ggt	atg	1248
Ile	Gly	Gln	Gln	Phe	Ala	Leu	His	Glu	Ala	Thr	Leu	Val	Leu	Gly	Met	
405							410						415			
atg	cta	aaa	cac	ttt	gac	ttt	gaa	gat	cat	aca	aac	tac	gag	ctg	gat	1296

Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu Asp			
420	425	430	
att aaa gaa act tta acg tta aaa cct gaa ggc ttt gtg gta aaa gca		1344	
Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys Ala			
435	440	445	
aaa tcg aaa aaa att ccg ctt ggc ggt att cct tca cct agc act gaa		1392	
Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr Glu			
450	455	460	
cag tct gct aaa aaa gta cgc aaa aag gca gaa aac gct cat aat acg		1440	
Gln Ser Ala Lys Lys Val Arg Lys Ala Glu Asn Ala His Asn Thr			
465	470	475	480
ccg ctg ctt gtg cta tac ggt tca aat atg gga aca gct gaa gga acg		1488	
Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly Thr			
485	490	495	
gct cgt gat tta gca gat att gca atg agc aaa gga ttt gca ccg cag		1536	
Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro Gln			
500	505	510	
gtc gca acg ctt gat tca cac gcc gga aat ctt ccg cgc gaa gga gct		1584	
Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly Ala			
515	520	525	
gta tta att gta acg gcg tct tat aac ggt cat ccg cct gat aac gca		1632	
Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn Ala			
530	535	540	
aag caa ttt gtc gac tgg tta gac caa gcg tct gct gat gaa gta aaa		1680	
Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val Lys			
545	550	555	560
ggc gtt cgc tac tcc gta ttt gga tgc ggc gat aaa aac tgg gct act		1728	
Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala Thr			
565	570	575	
acg tat caa aaa gtg cct gct ttt atc gat gaa acg ctt gcc gct aaa		1776	
Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala Lys			
580	585	590	
ggg gca gaa aac atc gct gac cgc ggt gaa gca gat gca agc gac gac		1824	
Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp Asp			
595	600	605	
ttt gaa ggc aca tat gaa gaa tgg cgt gaa cat atg tgg agt gac gta		1872	
Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp Val			
610	615	620	
gca gcc tac ttt aac ctc gac att gaa aac agt gaa gat aat aaa tct		1920	
Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys Ser			
625	630	635	640
act ctt tca ctt caa ttt gtc gac agc gcc gcg gat atg ccg ctt gcg		1968	
Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu Ala			
645	650	655	
aaa atg cac ggt gcg ttt tca acg aac gtc gta gca agc aaa gaa ctt		2016	
Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu Leu			
660	665	670	
caa cag cca ggc agt gca cga agc acg cga cat ctt gaa att gaa ctt		2064	
Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu Leu			
675	680	685	
cca aaa gaa gct tct tat caa gaa gga gat cat tta ggt gtt att cct		2112	
Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile Pro			
690	695	700	
cgc aac tat gaa gga ata gta aac cgt gta aca gca agg ttc ggc cta		2160	
Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly Leu			
705	710	715	720
gat gca tca cag caa atc cgt ctg gaa gca gaa gaa aaa tta gct		2208	

Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Glu Lys Leu Ala	725	730	735	
cat ttg cca ctc gct aaa aca gta tcc gta gaa gag ctt ctg caa tac				2256
His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln Tyr	740	745	750	
gtg gag ctt caa gat cct gtt acg cgc acg cag ctt cgc gca atg gct				2304
Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met Ala	755	760	765	
gct aaa acg gtc tgc ccg cat aaa gta gag ctt gaa gcc ttg ctt				2352
Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu Leu	770	775	780	
gaa aag caa gcc tac aaa gaa caa gtg ctg gca aaa cgt tta aca atg				2400
Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr Met	785	790	795	800
ctt gaa ctg ctt gaa aaa tac ccg gcg tgt gaa atg aaa ttc acg gaa				2448
Leu Glu Leu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser Glu	805	810	815	
ttt atc gcc ctt ctg cca agc ata cgc ccg cgc tat tac tcg att tct				2496
Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile Ser	820	825	830	
tca tca cct cgt gtc gat gaa aaa caa gca agc atc acg gtc agc gtt				2544
Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser Val	835	840	845	
gtc tca gga gaa gcg tgg agc gga tat gga gaa tat aaa gga att gcg				2592
Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile Ala	850	855	860	
tcg aac tat ctt gcc gag ctg caa gaa gga gat acg att acg tgc ttt				2640
Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys Phe	865	870	875	880
att tcc aca ccg cag tca gaa ttt acg ctg cca aaa gac cct gaa acg				2688
Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu Thr	885	890	895	
ccg ctt atc atg gtc gga ccg gga aca ggc gtc gcg ccg ttt aga ggc				2736
Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly	900	905	910	
ttt gtg cag gcg cgc aaa cag cta aaa gaa caa gga cag tca ctt gga				2784
Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu Gly	915	920	925	
gaa gca cat tta tac ttc ggc tgc cgt tca cct cat gaa gac tat ctg				2832
Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr Leu	930	935	940	
tat caa gaa gag ctt gaa aac gcc caa agc gaa ggc atc att acg ctt				2880
Tyr Gln Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr Leu	945	950	955	960
cat acc gct ttt tct cgc atg cca aat cag ccg aaa aca tac gtt cag				2928
His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val Gln	965	970	975	
cac gta atg gaa caa gac ggc aag aaa ttg att gaa ctt ctt gat caa				2976
His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp Gln	980	985	990	
gga gcg cac ttc tat att tgc gga gac gga agc caa atg gca cct gcc				3024
Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro Ala	995	1000	1005	
gtt gaa gca acg ctt atg aaa agc tat gct gac gtt cac caa gtg				3069
Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val	1010	1015	1020	
agt gaa gca gac gct cgc tta tgg ctg cag cag cta gaa gaa aaa				3114

Ser Glu Ala Asp Ala Arg Leu Trp Leu Gln Gln Leu Glu Glu Lys
 1025 1030 1035

ggc cga tac gca aaa gac gtg tgg gct ggg taa 3147
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Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys Ile
 20 25 30

Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg Val
 35 40 45

Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp Glu
 50 55 60

Ser Arg Phe Asp Lys Asn Leu Ser Gln Gly Leu Lys Phe Val Arg Asp
 65 70 75 80

Phe Ala Gly Asp Gly Leu Val Thr Ser Trp Thr His Glu Lys Asn Trp
 85 90 95

Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala Met
 100 105 110

Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val Gln
 115 120 125

Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu Asp
 130 135 140

Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn Tyr
 145 150 155 160

Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr Ser
 165 170 175

Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Gln Gln Arg Ala Asn
 180 185 190

Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu Asp
 195 200 205

Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg Lys
 210 215 220

Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn Gly
 225 230 235 240

Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg Tyr
 245 250 255

Gln Ile Ile Thr Phe Leu Ile Ala Gly His Glu Thr Thr Ser Gly Leu
 260 265 270

Leu Ser Phe Ala Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu Gln
 275 280 285

Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro Ser
 290 295 300

Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn Glu
 305 310 315 320
 Ala Leu Arg Leu Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala Lys
 325 330 335
 Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp Glu
 340 345 350
 Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp Gly
 355 360 365
 Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser Ala
 370 375 380
 Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala Cys
 385 390 395 400
 Ile Gly Gln Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly Met
 405 410 415
 Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu Asp
 420 425 430
 Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys Ala
 435 440 445
 Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr Glu
 450 455 460
 Gln Ser Ala Lys Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn Thr
 465 470 475 480
 Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly Thr
 485 490 495
 Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro Gln
 500 505 510
 Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly Ala
 515 520 525
 Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn Ala
 530 535 540
 Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val Lys
 545 550 555 560
 Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala Thr
 565 570 575
 Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala Lys
 580 585 590
 Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp Asp
 595 600 605
 Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp Val
 610 615 620
 Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys Ser
 625 630 635 640
 Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu Ala
 645 650 655
 Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu Leu
 660 665 670
 Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu Leu
 675 680 685
 Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile Pro
 690 695 700
 Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly Leu

705	710	715	720
Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Glu Lys Leu Ala			
725	730	735	
His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln Tyr			
740	745	750	
Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met Ala			
755	760	765	
Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu Leu			
770	775	780	
Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr Met			
785	790	795	800
Leu Glu Leu Leu Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser Glu			
805	810	815	
Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile Ser			
820	825	830	
Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser Val			
835	840	845	
Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile Ala			
850	855	860	
Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys Phe			
865	870	875	880
Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu Thr			
885	890	895	
Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg Gly			
900	905	910	
Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu Gly			
915	920	925	
Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr Leu			
930	935	940	
Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr Leu			
945	950	955	960
His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val Gln			
965	970	975	
His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp Gln			
980	985	990	
Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro Ala			
995	1000	1005	
Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val			
1010	1015	1020	
Ser Glu Ala Asp Ala Arg Leu Trp Leu Gln Gln Leu Glu Glu Lys			
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Gly Arg Tyr Ala Lys Asp Val Trp Ala Gly			
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Arg Thr Phe Thr Trp Phe Thr Pro Ala Arg Arg Lys Pro Thr Glu Tyr
20 25 30

gag ctc tac acc gtg ggt caa cag tcc act ccg gac gag tgg ctg cat 144
Glu Leu Tyr Thr Val Gly Gln Ser Thr Pro Asp Glu Trp Leu His
35 40 45

gtg gac tgg ccg ctg cgc ttc gac gac ggc cgc gcc ccg tgg gag gag 192
Val Asp Trp Pro Leu Arg Phe Asp Asp Gly Arg Ala Pro Trp Glu Glu
50 55 60

gag tcg agt gcg gta cgg acc tcg gag tgg tcg gct tac cgc gac cca 240
Glu Ser Ser Ala Val Arg Thr Ser Glu Trp Ser Ala Tyr Arg Asp Pro
65 70 75 80

cac caa ctg tgg cag cgt ccc tac gtc agc acg tgc aac cag gac cag 288
His Gln Leu Trp Gln Arg Pro Tyr Val Ser Thr Cys Asn Gln Asp Gln
85 90 95

cag gcc ctc gcg cgg ctg gtc ccc gtc ctg acc atg ggg tcg gcg gcg 336
Gln Ala Leu Ala Arg Leu Val Pro Val Leu Thr Met Gly Ser Ala Ala
100 105 110

atc acg ccc atc tgg tcg cag aag atc ctc gcc agg tcc tac gcc gcc 384
Ile Thr Pro Ile Trp Ser Gln Lys Ile Leu Ala Arg Ser Tyr Ala Ala
115 120 125

tgg cca ttc gtc gag tac ggg ctc ttc ctg agc ctg gcc tac gcc gtg 432
Trp Pro Phe Val Glu Tyr Gly Leu Phe Leu Ser Leu Ala Tyr Ala Val
130 135 140

cgc cag gcc atg tcc gac acg gtc cag ttc agc gtg gtg ttc cag gcc 480
Arg Gln Ala Met Ser Asp Thr Val Gln Phe Ser Val Val Phe Gln Ala
145 150 155 160

gtg gac cgc atg cgg ctg ctc cag gac atc gtc cac cac ctg gac cac 528
Val Asp Arg Met Arg Leu Leu Gln Asp Ile Val His His Leu Asp His
165 170 175

ctg cag gag tcg ccg gaa ttc agc gac gcc ggg gcc cgc gag gcc tgg 576
Leu Gln Glu Ser Pro Glu Phe Ser Asp Ala Gly Ala Arg Glu Ala Trp
180 185 190

atg tcc gac tcc acc ctg gtc ccg atc cgg gaa gtg atc gag cgc atc 624
Met Ser Asp Ser Thr Leu Val Pro Ile Arg Glu Val Ile Glu Arg Ile
195 200 205

gcc gcc agc cag gac tgg gtg gag atc ctg gtc gcc ggc acg ctc gtc 672
Ala Ala Ser Gln Asp Trp Val Glu Ile Leu Val Ala Gly Thr Leu Val
210 215 220

ttc gag cct ctg gtc ggc cac ctg gcg aag gcc gag ttg ttc agc cgc 720
Phe Glu Pro Leu Val Glu His Leu Ala Lys Ala Glu Leu Phe Ser Arg
225 230 235 240

cgt gcg cca atg ttc ggg gac ggg acc acg ccg gcg gtg ctg gcg tcg 768
Arg Ala Pro Met Phe Gly Asp Gly Thr Thr Pro Ala Val Leu Ala Ser
245 250 255

gcc ctg ctg gac agc ggc agg cac ctc gaa tcg gtc cag gcg ctc gtc 816
Ala Leu Leu Asp Ser Gly Arg His Leu Glu Ser Val Gln Ala Leu Val
260 265 270

cgc ctc gtc tgc caa gac ccc gtc cat ggc gac cag aac cag gcg act 864
Arg Leu Val Cys Gln Asp Pro Val His Gly Asp Gln Asn Gln Ala Thr
275 280 285

gtg cgg cgg tgg atc gag gaa tgg cag ccg cgg tgc aag gcg gcg gcc 912
Val Arg Arg Trp Ile Glu Glu Trp Gln Pro Arg Cys Lys Ala Ala Ala
290 295 300

cag tcc ttc ctg ccg acg ttc tcc gac tgc ggc atc gac gac gac gaa	960
Gln Ser Phe Leu Pro Thr Phe Ser Asp Cys Gly Ile Asp Ala Lys Glu	
305 310 315 320	
agc gcc aac gcg ctg tcc cgg gcg ctg gcg aac cag cgg gcc gcc gtc	1008
Ser Ala Asn Ala Leu Ser Arg Ala Leu Ala Asn Gln Arg Ala Ala Val	
325 330 335	
gag ggc gcc ggc atc acg gca tga	1032
Glu Gly Ala Gly Ile Thr Ala	
340	
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1 5 10 15	
Arg Thr Phe Thr Trp Phe Thr Pro Ala Arg Arg Lys Pro Thr Glu Tyr	
20 25 30	
Glu Leu Tyr Thr Val Gly Gln Gln Ser Thr Pro Asp Glu Trp Leu His	
35 40 45	
Val Asp Trp Pro Leu Arg Phe Asp Asp Gly Arg Ala Pro Trp Glu Glu	
50 55 60	
Glu Ser Ser Ala Val Arg Thr Ser Glu Trp Ser Ala Tyr Arg Asp Pro	
65 70 75 80	
His Gln Leu Trp Gln Arg Pro Tyr Val Ser Thr Cys Asn Gln Asp Gln	
85 90 95	
Gln Ala Leu Ala Arg Leu Val Pro Val Leu Thr Met Gly Ser Ala Ala	
100 105 110	
Ile Thr Pro Ile Trp Ser Gln Lys Ile Leu Ala Arg Ser Tyr Ala Ala	
115 120 125	
Trp Pro Phe Val Glu Tyr Gly Leu Phe Leu Ser Leu Ala Tyr Ala Val	
130 135 140	
Arg Gln Ala Met Ser Asp Thr Val Gln Phe Ser Val Val Phe Gln Ala	
145 150 155 160	
Val Asp Arg Met Arg Leu Leu Gln Asp Ile Val His His Leu Asp His	
165 170 175	
Leu Gln Glu Ser Pro Glu Phe Ser Asp Ala Gly Ala Arg Glu Ala Trp	
180 185 190	
Met Ser Asp Ser Thr Leu Val Pro Ile Arg Glu Val Ile Glu Arg Ile	
195 200 205	
Ala Ala Ser Gln Asp Trp Val Glu Ile Leu Val Ala Gly Thr Leu Val	
210 215 220	
Phe Glu Pro Leu Val Glu His Leu Ala Lys Ala Glu Leu Phe Ser Arg	
225 230 235 240	
Arg Ala Pro Met Phe Gly Asp Gly Thr Thr Pro Ala Val Leu Ala Ser	
245 250 255	
Ala Leu Leu Asp Ser Gly Arg His Leu Glu Ser Val Gln Ala Leu Val	
260 265 270	
Arg Leu Val Cys Gln Asp Pro Val His Gly Asp Gln Asn Gln Ala Thr	
275 280 285	
Val Arg Arg Trp Ile Glu Glu Trp Gln Pro Arg Cys Lys Ala Ala Ala	

290	295	300															
Gln Ser Phe Leu Pro Thr Phe Ser Asp Cys Gly Ile Asp Ala Lys Glu																	
305	310	315	320														
Ser Ala Asn Ala Leu Ser Arg Ala Leu Ala Asn Gln Arg Ala Ala Val																	
325	330	335															
Glu Gly Ala Gly Ile Thr Ala																	
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atg	gca	tcg	aac	ccc	acc	cag	ctc	cac	gag	aag	tcg	aag	tcc	tac	gac		48
Met	Ala	Ser	Asn	Pro	Thr	Gln	Leu	His	Glu	Lys	Ser	Lys	Ser	Tyr	Asp		
1							5			10				15			
tgg	gac	ttc	acc	tcc	gtc	gag	cgg	cgc	ccc	aag	ttc	gag	acg	aag	tac		96
Trp	Asp	Phe	Thr	Ser	Val	Glu	Arg	Arg	Pro	Lys	Phe	Glu	Thr	Lys	Tyr		
20							25						30				
aag	atg	ccc	aag	aag	ggc	aag	gac	ccg	ttc	cgc	gtc	ctg	atc	cgt	gac		144
Lys	Met	Pro	Lys	Lys	Gly	Lys	Asp	Pro	Phe	Arg	Pro	Lys	Leu	Ile	Arg	Asp	
35							40						45				
tac	atg	aag	atg	gaa	gcg	gag	aag	gac	cg	acc	cat	ggc	ttc	ctc		192	
Tyr	Met	Lys	Met	Glu	Ala	Glu	Lys	Asp	Asp	Arg	Thr	His	Gly	Phe	Leu		
50							55						60				
gac	ggc	gcc	gtg	cgg	acg	cgt	gag	gcc	acc	agg	att	gag	ccg	cgg	ttc		240
Asp	Gly	Ala	Val	Arg	Thr	Arg	Glu	Ala	Thr	Arg	Ile	Glu	Pro	Arg	Phe		
65							70						75			80	
gct	gag	gcc	atg	aag	atc	atg	gtg	ccg	cag	ctg	acc	aac	gcc	gag	tac		288
Ala	Glu	Ala	Met	Lys	Ile	Met	Val	Pro	Gln	Leu	Thr	Asn	Ala	Glu	Tyr		
85							90						95				
cag	gcg	gtg	gag	ggc	tgc	gga	atg	atc	atc	tcg	gcc	gtc	gag	aac	cag		336
Gln	Ala	Val	Ala	Gly	Cys	Gly	Met	Ile	Ile	Ser	Ala	Val	Glu	Asn	Gln		
100							105						110				
gag	ctc	cgt	cag	ggc	tac	gcc	gct	cag	atg	ctc	gat	gag	gtg	cgg	cac		384
Glu	Leu	Arg	Gln	Gly	Tyr	Ala	Ala	Gln	Met	Leu	Asp	Glu	Val	Arg	His		
115							120						125				
gcg	cag	ctc	gag	atg	acg	cta	cgc	aac	tac	tac	gcg	aag	cac	tgg	tgc		432
Ala	Gln	Leu	Glu	Met	Thr	Leu	Arg	Asn	Tyr	Tyr	Ala	Lys	His	Trp	Cys		
130							135						140				
gat	ccc	tcc	ggc	ttc	gac	atc	ggt	cag	cgc	ggc	ctg	tac	cag	cac	ccc		480
Asp	Pro	Ser	Gly	Phe	Asp	Ile	Gly	Gln	Arg	Gly	Leu	Tyr	Gln	His	Pro		
145							150						155			160	
gcg	ggg	ctg	gtg	tcc	atc	ggc	gag	ttc	cag	cac	ttc	aat	act	ggt	gac		528
Ala	Gly	Leu	Val	Ser	Ile	Gly	Glu	Phe	Gln	His	Phe	Asn	Thr	Gly	Asp		
165							170						175				
ccg	ctt	gac	gtc	atc	atc	gat	ctc	aac	atc	gtg	gcc	gag	acg	gcg	ttc		576
Pro	Leu	Asp	Val	Ile	Ile	Asp	Leu	Asn	Ile	Val	Ala	Glu	Thr	Ala	Phe		
180							185						190				
acg	aac	atc	ctg	ctg	gtg	gcc	act	cca	cag	gtc	gcc	gtg	gcc	aac	ggg		624
Thr	Asn	Ile	Leu	Leu	Val	Ala	Thr	Pro	Gln	Val	Ala	Val	Ala	Asn	Gly		
195							200						205				
gac	aac	atc	atg	gcc	agg	gtc	ttc	ctc	tcg	atc	cag	tcg	gac	gag	gcc		672

Asp Asn Ala Met Ala Ser Val Phe Leu Ser Ile Gln Ser Asp Glu Ala			
210	215	220	
agg cac atg gcc aac ggg tac ggc tcg atg gcg ctg ctg gag aac		720	
Arg His Met Ala Asn Gly Tyr Gly Ser Val Met Ala Leu Leu Glu Asn			
225	230	235	240
gag gac aac ctc ccg ctg ctc aac cag tct ctc gat cgg cac ttc tgg		768	
Glu Asp Asn Leu Pro Leu Leu Asn Gln Ser Leu Asp Arg His Phe Trp			
245	250	255	
cgt gcc cac aag gcc ttg gac aac gcg gtc gga tgg tgt tcg gag tat		816	
Arg Ala His Lys Ala Leu Asp Asn Ala Val Gly Trp Cys Ser Glu Tyr			
260	265	270	
ggc gcc cgc aag cgg cca tgg agc tac aag gcc cag tgg gag gaa tgg		864	
Gly Ala Arg Lys Arg Pro Trp Ser Tyr Lys Ala Gln Trp Glu Glu Trp			
275	280	285	
gtc gtc gac gac ttc gtg ggc ggc tac atc gac cga ctc agc gag ttc		912	
Val Val Asp Asp Phe Val Gly Gly Tyr Ile Asp Arg Leu Ser Glu Phe			
290	295	300	
ggc gtt cag gct ccg gcc tgc ctt ggc gcg gcc gac gag gtc aag		960	
Gly Val Gln Ala Pro Ala Cys Leu Gly Ala Ala Asp Glu Val Lys			
305	310	315	320
tgg tcg cac cac acg ctc ggt cag gtg ctg tcg gcg gtg tgg ccg ctg		1008	
Trp Ser His His Thr Leu Gly Gln Val Leu Ser Ala Val Trp Pro Leu			
325	330	335	
aac ttc tgg cgc tcg gac gcc atg gga ccg gcg gac ttc gag tgg ttc		1056	
Asn Phe Trp Arg Ser Asp Ala Met Gly Pro Ala Asp Phe Glu Trp Phe			
340	345	350	
gag aac cac tac ccg ggc tgg agc gcg gcc tac cag ggt tac tgg gag		1104	
Glu Asn His Tyr Pro Gly Trp Ser Ala Ala Tyr Gln Gly Tyr Trp Glu			
355	360	365	
ggc tac aag gcg ctc gcc gac cca gca ggc gga cgc atc atg ctc cag		1152	
Gly Tyr Lys Ala Leu Ala Asp Pro Ala Gly Gly Arg Ile Met Leu Gln			
370	375	380	
gag ctg ccg ggt ctg ccg ccg atg tgt cag gtg tgc cag gtg ccg tgc		1200	
Glu Leu Pro Gly Leu Pro Pro Met Cys Gln Val Cys Gln Val Pro Cys			
385	390	395	400
gtg atg ccg cgg ctg gat atg aac gcc gcg atc atc gag ttc gag		1248	
Val Met Pro Arg Leu Asp Met Asn Ala Ala Arg Ile Ile Glu Phe Glu			
405	410	415	
ggg cag aaa atc gcg ctg tgc agc gaa ccc tgc cag cgg atc ttc acc		1296	
Gly Gln Lys Ile Ala Leu Cys Ser Glu Pro Cys Gln Arg Ile Phe Thr			
420	425	430	
aac tgg ccg gag gcg tac cgc cac cgc aag caa tac tgg gcc cgc tac		1344	
Asn Trp Pro Glu Ala Tyr Arg His Arg Lys Gln Tyr Trp Ala Arg Tyr			
435	440	445	
cac gga tgg gac ctg gcg gac gtc atc gtt gat ctc ggc tac atc cgc		1392	
His Gly Trp Asp Leu Ala Asp Val Ile Val Asp Leu Gly Tyr Ile Arg			
450	455	460	
ccg gac ggc aag acc ctc atc ggc cag ccg ctg ctc gag atg gag cgg		1440	
Pro Asp Gly Lys Thr Leu Ile Gly Gln Pro Leu Leu Glu Met Glu Arg			
465	470	475	480
ctg tgg acc atc gac gac atc cgg gcc ctt cag tac gaa gtc aag gac		1488	
Leu Trp Thr Ile Asp Asp Ile Arg Ala Leu Gln Tyr Glu Val Lys Asp			
485	490	495	
ccg ttg cag gag gcg tga		1506	
Pro Leu Gln Glu Ala			
500			

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 <211> 501
 <212> PRT
 <213> Nocardia corallina

<400> 12

Met Ala Ser Asn Pro Thr Gln Leu His Glu Lys Ser Lys Ser Tyr Asp
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Trp Asp Phe Thr Ser Val Glu Arg Arg Pro Lys Phe Glu Thr Lys Tyr
 20 25 30

Lys Met Pro Lys Lys Gly Lys Asp Pro Phe Arg Val Leu Ile Arg Asp
 35 40 45

Tyr Met Lys Met Glu Ala Glu Lys Asp Asp Arg Thr His Gly Phe Leu
 50 55 60

Asp Gly Ala Val Arg Thr Arg Glu Ala Thr Arg Ile Glu Pro Arg Phe
 65 70 75 80

Ala Glu Ala Met Lys Ile Met Val Pro Gln Leu Thr Asn Ala Glu Tyr
 85 90 95

Gln Ala Val Ala Gly Cys Gly Met Ile Ile Ser Ala Val Glu Asn Gln
 100 105 110

Glu Leu Arg Gln Gly Tyr Ala Ala Gln Met Leu Asp Glu Val Arg His
 115 120 125

Ala Gln Leu Glu Met Thr Leu Arg Asn Tyr Tyr Ala Lys His Trp Cys
 130 135 140

Asp Pro Ser Gly Phe Asp Ile Gly Gln Arg Gly Leu Tyr Gln His Pro
 145 150 155 160

Ala Gly Leu Val Ser Ile Gly Glu Phe Gln His Phe Asn Thr Gly Asp
 165 170 175

Pro Leu Asp Val Ile Ile Asp Leu Asn Ile Val Ala Glu Thr Ala Phe
 180 185 190

Thr Asn Ile Leu Leu Val Ala Thr Pro Gln Val Ala Val Ala Asn Gly
 195 200 205

Asp Asn Ala Met Ala Ser Val Phe Leu Ser Ile Gln Ser Asp Glu Ala
 210 215 220

Arg His Met Ala Asn Gly Tyr Gly Ser Val Met Ala Leu Leu Glu Asn
 225 230 235 240

Glu Asp Asn Leu Pro Leu Leu Asn Gln Ser Leu Asp Arg His Phe Trp
 245 250 255

Arg Ala His Lys Ala Leu Asp Asn Ala Val Gly Trp Cys Ser Glu Tyr
 260 265 270

Gly Ala Arg Lys Arg Pro Trp Ser Tyr Lys Ala Gln Trp Glu Glu Trp
 275 280 285

Val Val Asp Asp Phe Val Gly Gly Tyr Ile Asp Arg Leu Ser Glu Phe
 290 295 300

Gly Val Gln Ala Pro Ala Cys Leu Gly Ala Ala Ala Asp Glu Val Lys
 305 310 315 320

Trp Ser His His Thr Leu Gly Gln Val Leu Ser Ala Val Trp Pro Leu
 325 330 335

Asn Phe Trp Arg Ser Asp Ala Met Gly Pro Ala Asp Phe Glu Trp Phe
 340 345 350

Glu Asn His Tyr Pro Gly Trp Ser Ala Ala Tyr Gln Gly Tyr Trp Glu
 355 360 365

Gly Tyr Lys Ala Leu Ala Asp Pro Ala Gly Gly Arg Ile Met Leu Gln
 370 375 380

Glu Leu Pro Gly Leu Pro Pro Met Cys Gln Val Cys Gln Val Pro Cys
 385 390 395 400

Val Met Pro Arg Leu Asp Met Asn Ala Ala Arg Ile Ile Glu Phe Glu
 405 410 415

Gly Gln Lys Ile Ala Leu Cys Ser Glu Pro Cys Gln Arg Ile Phe Thr
 420 425 430

Asn Trp Pro Glu Ala Tyr Arg His Arg Lys Gln Tyr Trp Ala Arg Tyr
 435 440 445

His Gly Trp Asp Leu Ala Asp Val Ile Val Asp Leu Gly Tyr Ile Arg
 450 455 460

Pro Asp Gly Lys Thr Leu Ile Gly Gln Pro Leu Leu Glu Met Glu Arg
 465 470 475 480

Leu Trp Thr Ile Asp Asp Ile Arg Ala Leu Gln Tyr Glu Val Lys Asp
 485 490 495

Pro Leu Gln Glu Ala
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<213> Xanthobacteria sp.

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Met	Ala	Leu	Leu	Asn	Arg	Asp	Asp	Trp	Tyr	Asp	Ile	Ala	Arg	Asp	Val		
1		5							10					15			
gac	tgg	acg	ctc	agc	tat	gtc	gac	cgc	gcg	gtc	gcc	ttt	ccc	gag	gag	96	
Asp	Trp	Thr	Leu	Ser	Tyr	Val	Asp	Arg	Ala	Val	Ala	Phe	Pro	Glu	Glu		
20							25					30					
tgg	aaa	ggc	gaa	aag	gac	att	tgc	ggc	acg	gcc	tgg	gac	gat	tgg	gac	144	
Trp	Lys	Gly	Glu	Lys	Asp	Ile	Cys	Gly	Thr	Ala	Trp	Asp	Asp	Trp	Asp		
35						40					45						
gag	ccc	ttc	cg	gtc	tcc	ttc	cgc	gaa	tat	gtg	atg	gtc	cag	cgc	gac	192	
Glu	Pro	Phe	Arg	Val	Ser	Phe	Arg	Glu	Tyr	Val	Met	Val	Gln	Arg	Asp		
50						55					60						
aag	gaa	g	cg	g	tc	gg	gc	gc	at	tc	at	gt	cg	gc	gc	aa	240
Lys	Glu	Ala	Ser	Val	Gly	Ala	Ile	Arg	Glu	Ala	Met	Val	Arg	Ala	Lys		
65						70					75			80			
gcc	tat	gag	aag	ctc	gac	gac	ggc	cac	aag	gcc	acc	tcg	cac	ctg	cac	288	
Ala	Tyr	Glu	Lys	Leu	Asp	Asp	Gly	His	Lys	Ala	Thr	Ser	His	Leu	His		
85							90					95					
atg	ggc	acc	atc	acc	atg	gtg	gag	cac	atg	g	gc	gtc	acc	atg	cag	agc	336
Met	Gly	Thr	Ile	Thr	Met	Val	Glu	His	Met	Ala	Val	Thr	Met	Gln	Ser		
100						105					110						
cg	ttc	gt	cg	ttc	g	cg	cc	tcc	gc	cg	tgg	cg	ag	ctc	gg	cg	384
Arg	Phe	Val	Arg	Phe	Ala	Pro	Ser	Ala	Arg	Trp	Arg	Ser	Leu	Gly	Ala		
115							120					125					
ttc	ggc	at	ct	g	ac	g	ac	cg	ca	cc	ca	tc	g	ct	cg	ttc	432
Phe	Gly	Met	Leu	Asp	Glu	Thr	Arg	His	Thr	Gln	Leu	Asp	Leu	Arg	Phe		
130							135				140						
agc	cac	gat	ct	ctc	aa	gat	tcc	ccg	ag	ttc	gac	tgg	ag	cag	cg	480	

Ser His Asp Leu Leu Asn Asp Ser Pro Ser Phe Asp Trp Ser Gln Arg	145	150	155	160	
gcg ttc cac acc gac gaa tgg gcg gtt ctc gcc acc cgc aac ctg ttc					528
Ala Phe His Thr Asp Glu Trp Ala Val Leu Ala Thr Arg Asn Leu Phe	165	170	175		
gac gac atc atg ctc aac gcc gac tgc gtg gag gcg gcg ctc gcc acc					576
Asp Asp Ile Met Leu Asn Ala Asp Cys Val Glu Ala Ala Leu Ala Thr	180	185	190		
agc ctg acg ctg gag cac ggc ttc acc aac atc cag ttc gtg gcg ctc					624
Ser Leu Thr Leu Glu His Gly Phe Thr Asn Ile Gln Phe Val Ala Leu	195	200	205		
gcc tcc gac gcc atg gaa gcc ggc gac gtg aac ttc tcc aac ctc ttg					672
Ala Ser Asp Ala Met Glu Ala Gly Asp Val Asn Phe Ser Asn Leu Leu	210	215	220		
tcg agc atc cag acc gac gag gcg cgg cac gcc cag ttg ggc ttt ccc					720
Ser Ser Ile Gln Thr Asp Glu Ala Arg His Ala Gln Leu Gly Phe Pro	225	230	235	240	
acc ctc gac gtg atg atg aag cac gac ccc aag cgc gcc cag cag atc					768
Thr Leu Asp Val Met Met Lys His Asp Pro Lys Arg Ala Gln Gln Ile	245	250	255		
ctg gac gtc gcc ttc tgg cgc tcc tac cgc atc ttc cag gcg gtg acc					816
Leu Asp Val Ala Phe Trp Arg Ser Tyr Arg Ile Phe Gln Ala Val Thr	260	265	270		
ggc gtc tcc atg gac tac tac acg ccc gtc gcc aag cgg cag atg tcg					864
Gly Val Ser Met Asp Tyr Tyr Thr Pro Val Ala Lys Arg Gln Met Ser	275	280	285		
ttc aag gag ttc atg ctg gag tgg atc gtc aag cat cat gag cgc atc					912
Phe Lys Glu Phe Met Leu Glu Trp Ile Val Lys His His Glu Arg Ile	290	295	300		
ctg cgc gac tac ggc ctc cag aag ccc tgg tac tgg gac acg ttc gag					960
Leu Arg Asp Tyr Gly Leu Gln Lys Pro Trp Tyr Trp Asp Thr Phe Glu	305	310	315	320	
aag acc ctc gat cac ggc cac cac gcg ctg cac atc ggc acc tgg ttc					1008
Lys Thr Leu Asp His Gly His His Ala Leu His Ile Gly Thr Trp Phe	325	330	335		
tgg cgc ccg acc ctg ttc tgg gat ccc aat ggc ggc gtc tcg cgc gag					1056
Trp Arg Pro Thr Leu Phe Trp Asp Pro Asn Gly Gly Val Ser Arg Glu	340	345	350		
gag cgg cgc tgg ctg aac cag aag tat ccg aac tgg gaa gag agc tgg					1104
Glu Arg Arg Trp Leu Asn Gln Lys Tyr Pro Asn Trp Glu Glu Ser Trp	355	360	365		
ggc gtc ctg tgg gac gag atc atc tcc aac atc aat gcg ggc aac att					1152
Gly Val Leu Trp Asp Glu Ile Ile Ser Asn Ile Asn Ala Gly Asn Ile	370	375	380		
gaa aag acc ttg ccc gag acg ctg ccg atg ctg tgc aac gtc acc aac					1200
Glu Lys Thr Leu Pro Glu Thr Leu Pro Met Leu Cys Asn Val Thr Asn	385	390	395	400	
ctg ccc atc ggc tcg cac tgg gac cgc ttc cac ctg aag ccc gag cag					1248
Leu Pro Ile Gly Ser His Trp Asp Arg Phe His Leu Lys Pro Glu Gln	405	410	415		
ctc gtc tac aag ggg cgg ctc tac acc ttc gac agc gac gtc tcc aag					1296
Leu Val Tyr Lys Gly Arg Leu Tyr Thr Phe Asp Ser Asp Val Ser Lys	420	425	430		
tgg atc ttc gag ctc gat ccg gag cgc tat gcc ggc cac acc aac gtg					1344
Trp Ile Phe Glu Leu Asp Pro Glu Arg Tyr Ala Gly His Thr Asn Val	435	440	445		
gtc gac cgc ttc atc ggc ggg cag atc cag ccc atg acc atc gag ggc					1392

Val Asp Arg Phe Ile Gly Gly Gln Ile Gln Pro Met Thr Ile Glu Gly		
450	455	460
gtg ctc aac tgg atg ggc ctg acg ccc gaa gtc atg ggc aag gac gtg		1440
Val Leu Asn Trp Met Gly Leu Thr Pro Glu Val Met Gly Lys Asp Val		
465	470	475
480		
ttc aac tac cgt tgg gcc ggc gat tac gcc gag aac cgg atc gcc gcc		1488
Phe Asn Tyr Arg Trp Ala Gly Asp Tyr Ala Glu Asn Arg Ile Ala Ala		
485	490	495
gag taa		1494
Glu		

<210> 14
 <211> 497
 <212> PRT
 <213> Xanthobacteria sp.

<400> 14

Met Ala Leu Leu Asn Arg Asp Asp Trp Tyr Asp Ile Ala Arg Asp Val		
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15		

Asp Trp Thr Leu Ser Tyr Val Asp Arg Ala Val Ala Phe Pro Glu Glu		
20	25	30

Trp Lys Gly Glu Lys Asp Ile Cys Gly Thr Ala Trp Asp Asp Trp Asp		
35	40	45

Glu Pro Phe Arg Val Ser Phe Arg Glu Tyr Val Met Val Gln Arg Asp		
50	55	60

Lys Glu Ala Ser Val Gly Ala Ile Arg Glu Ala Met Val Arg Ala Lys		
65	70	75
80		

Ala Tyr Glu Lys Leu Asp Asp Gly His Lys Ala Thr Ser His Leu His		
85	90	95

Met Gly Thr Ile Thr Met Val Glu His Met Ala Val Thr Met Gln Ser		
100	105	110

Arg Phe Val Arg Phe Ala Pro Ser Ala Arg Trp Arg Ser Leu Gly Ala		
115	120	125

Phe Gly Met Leu Asp Glu Thr Arg His Thr Gln Leu Asp Leu Arg Phe		
130	135	140

Ser His Asp Leu Leu Asn Asp Ser Pro Ser Phe Asp Trp Ser Gln Arg		
145	150	155
160		

Ala Phe His Thr Asp Glu Trp Ala Val Leu Ala Thr Arg Asn Leu Phe		
165	170	175

Asp Asp Ile Met Leu Asn Ala Asp Cys Val Glu Ala Ala Leu Ala Thr		
180	185	190

Ser Leu Thr Leu Glu His Gly Phe Thr Asn Ile Gln Phe Val Ala Leu		
195	200	205

Ala Ser Asp Ala Met Glu Ala Gly Asp Val Asn Phe Ser Asn Leu Leu		210
215	220	

Ser Ser Ile Gln Thr Asp Glu Ala Arg His Ala Gln Leu Gly Phe Pro		
225	230	235
240		

Thr Leu Asp Val Met Met Lys His Asp Pro Lys Arg Ala Gln Gln Ile		
245	250	255

Leu Asp Val Ala Phe Trp Arg Ser Tyr Arg Ile Phe Gln Ala Val Thr		
260	265	270

Gly Val Ser Met Asp Tyr Tyr Thr Pro Val Ala Lys Arg Gln Met Ser		
275	280	285

Phe Lys Glu Phe Met Leu Glu Trp Ile Val Lys His His Glu Arg Ile
 290 295 300
 Leu Arg Asp Tyr Gly Leu Gln Lys Pro Trp Tyr Trp Asp Thr Phe Glu
 305 310 315 320
 Lys Thr Leu Asp His Gly His His Ala Leu His Ile Gly Thr Trp Phe
 325 330 335
 Trp Arg Pro Thr Leu Phe Trp Asp Pro Asn Gly Gly Val Ser Arg Glu
 340 345 350
 Glu Arg Arg Trp Leu Asn Gln Lys Tyr Pro Asn Trp Glu Glu Ser Trp
 355 360 365
 Gly Val Leu Trp Asp Glu Ile Ile Ser Asn Ile Asn Ala Gly Asn Ile
 370 375 380
 Glu Lys Thr Leu Pro Glu Thr Leu Pro Met Leu Cys Asn Val Thr Asn
 385 390 395 400
 Leu Pro Ile Gly Ser His Trp Asp Arg Phe His Leu Lys Pro Glu Gln
 405 410 415
 Leu Val Tyr Lys Gly Arg Leu Tyr Thr Phe Asp Ser Asp Val Ser Lys
 420 425 430
 Trp Ile Phe Glu Leu Asp Pro Glu Arg Tyr Ala Gly His Thr Asn Val
 435 440 445
 Val Asp Arg Phe Ile Gly Gly Gln Ile Gln Pro Met Thr Ile Glu Gly
 450 455 460
 Val Leu Asn Trp Met Gly Leu Thr Pro Glu Val Met Gly Lys Asp Val
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 Phe Asn Tyr Arg Trp Ala Gly Asp Tyr Ala Glu Asn Arg Ile Ala Ala
 485 490 495
 Glu

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 <213> Xanthobacteria sp.

<220>
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 atg aca cag cag cgc ccc acc cgc acg cgc gag cgc aag aag acc tgg 48
 Met Thr Gln Gln Arg Pro Thr Arg Thr Arg Glu Arg Lys Lys Thr Trp
 1 5 10 15

acg gct ttc ggc aat ctc gga cgc aag ccg acc gac tac gag gtc gtc 96
 Thr Ala Phe Gly Asn Leu Gly Arg Lys Pro Thr Asp Tyr Glu Val Val
 20 25 30

acc cac aac atg aac cac acc atg cgc ggc acg ccc ctg gag ctg tcg 144
 Thr His Asn Met Asn His Thr Met Arg Gly Thr Pro Leu Glu Leu Ser
 35 40 45

ccg acg gtg cac gcc aat gtg tgg ctc aag aag aac cgc gac gag atc 192
 Pro Thr Val His Ala Asn Val Trp Leu Lys Lys Asn Arg Asp Glu Ile
 50 55 60

gcg ctc aag gtc gac agc tgg gat ctg ttc cgc gat ccc gac cgc acc 240
 Ala Leu Lys Val Asp Ser Trp Asp Leu Phe Arg Asp Pro Asp Arg Thr
 65 70 75 80

acc tac gac acc tac gtc aag atg cag gac gac cag gag acc tat gtc 288

Thr Tyr Asp Thr Tyr Val Lys Met Gln Asp Asp Gln Glu Thr Tyr Val	85	90	95	
gac aac ctg ctc ctg tcc tac acc ggc gag ggc cgc tac gac gag gag				336
Asp Asn Leu Leu Leu Ser Tyr Thr Gly Glu Gly Arg Tyr Asp Glu Glu	100	105	110	
ctt tcc tcg cgc agc ctc gac ctc ctg tcc gcg ggg ctg acg ccg acc				384
Leu Ser Ser Arg Ser Leu Asp Leu Leu Ser Ala Gly Leu Thr Pro Thr	115	120	125	
cgc tat ctg ggc cat ggg ctg cag atg ctc gcg gcc tat atc cag cag				432
Arg Tyr Leu Gly His Gly Leu Gln Met Leu Ala Ala Tyr Ile Gln Gln	130	135	140	
ctc gcc ccg tcg gcc tat gtg ggc aat tgc gcg gtg ttc cag acc tcc				480
Leu Ala Pro Ser Ala Tyr Val Gly Asn Cys Ala Val Phe Gln Thr Ser	145	150	155	160
gac ggc ctg cgc cgc gtg cag cgc gtc gcc tac cgc acc cgc cag ctc				528
Asp Ala Leu Arg Arg Val Gln Arg Val Ala Tyr Arg Thr Arg Gln Leu	165	170	175	
gcc gac gcc cat ccg gcc cgc ggc ttc ggc tcc ggc gac cgg gcg gtg				576
Ala Asp Ala His Pro Ala Arg Gly Phe Gly Ser Gly Asp Arg Ala Val	180	185	190	
tgg gag aag tcc ccg gac tgg cag ccc atc cgc aag gcc atc gag gag				624
Trp Glu Lys Ser Pro Asp Trp Gln Pro Ile Arg Lys Ala Ile Glu Glu	195	200	205	
ctg ctc gtc acc ttc gaa tgg gac aag gcg ctc gcc ggc acc aat ttc				672
Leu Leu Val Thr Phe Glu Trp Asp Lys Ala Leu Ala Gly Thr Asn Phe	210	215	220	
gtg gtg aag ccg atc ctc gac gag ctg ttc ctc aac cac ctg gcg cgc				720
Val Val Lys Pro Ile Leu Asp Glu Leu Phe Leu Asn His Leu Ala Arg	225	230	235	240
ctg ctc cac gtg gag ggc gac gag ctc gac agc ctc gtg ctg cgg aac				768
Leu Leu His Val Glu Gly Asp Glu Leu Asp Ser Leu Val Leu Arg Asn	245	250	255	
ctt cac ggc gac gcc cag cgc cac gcc cgc tgg acg gcc gcg ctc ggc				816
Leu His Gly Asp Ala Gln Arg His Ala Arg Trp Thr Ala Ala Leu Gly	260	265	270	
cgc ttc gcc gtc gag cag aac gtg aac aac cgc acg gtc ctg cgc gac				864
Arg Phe Ala Val Glu Gln Asn Val Asn Asn Arg Thr Val Leu Arg Asp	275	280	285	
gcc atc gcc ggc tgg cac gag acc ggc gag gcg gtc ctc gcc gcg ggc				912
Ala Ile Ala Gly Trp His Glu Thr Gly Glu Ala Val Leu Ala Ala Gly	290	295	300	
gcc ggg atg ctt gcg agc cgc gcc ccc agc gcg gat gcg gcc aag atc				960
Ala Gly Met Leu Ala Ser Arg Ala Pro Ser Ala Asp Ala Ala Lys Ile	305	310	315	320
gcc gac gag gtc cgc gcc acg ctc gcg cag ctg cac gcc aat gcg ggc				1008
Ala Asp Glu Val Arg Ala Thr Leu Ala Gln Leu His Ala Asn Ala Gly	325	330	335	
ctc ggg cac gat gcc tga				1026
Leu Gly His Asp Ala	340			

<210> 16
 <211> 341
 <212> PRT
 <213> Xanthobacteria sp.

<400> 16

Met Thr Gln Gln Arg Pro Thr Arg Thr Arg Glu Arg Lys Lys Thr Trp

1	5	10	15
Thr Ala Phe Gly Asn Leu Gly Arg Lys Pro Thr Asp Tyr Glu Val Val			
20	25	30	
Thr His Asn Met Asn His Thr Met Arg Gly Thr Pro Leu Glu Leu Ser			
35	40	45	
Pro Thr Val His Ala Asn Val Trp Leu Lys Lys Asn Arg Asp Glu Ile			
50	55	60	
Ala Leu Lys Val Asp Ser Trp Asp Leu Phe Arg Asp Pro Asp Arg Thr			
65	70	75	80
Thr Tyr Asp Thr Tyr Val Lys Met Gln Asp Asp Gln Glu Thr Tyr Val			
85	90	95	
Asp Asn Leu Leu Ser Tyr Thr Gly Glu Gly Arg Tyr Asp Glu Glu			
100	105	110	
Leu Ser Ser Arg Ser Leu Asp Leu Leu Ser Ala Gly Leu Thr Pro Thr			
115	120	125	
Arg Tyr Leu Gly His Gly Leu Gln Met Leu Ala Ala Tyr Ile Gln Gln			
130	135	140	
Leu Ala Pro Ser Ala Tyr Val Gly Asn Cys Ala Val Phe Gln Thr Ser			
145	150	155	160
Asp Ala Leu Arg Arg Val Gln Arg Val Ala Tyr Arg Thr Arg Gln Leu			
165	170	175	
Ala Asp Ala His Pro Ala Arg Gly Phe Gly Ser Gly Asp Arg Ala Val			
180	185	190	
Trp Glu Lys Ser Pro Asp Trp Gln Pro Ile Arg Lys Ala Ile Glu Glu			
195	200	205	
Leu Leu Val Thr Phe Glu Trp Asp Lys Ala Leu Ala Gly Thr Asn Phe			
210	215	220	
Val Val Lys Pro Ile Leu Asp Glu Leu Phe Leu Asn His Leu Ala Arg			
225	230	235	240
Leu Leu His Val Glu Gly Asp Glu Leu Asp Ser Leu Val Leu Arg Asn			
245	250	255	
Leu His Gly Asp Ala Gln Arg His Ala Arg Trp Thr Ala Ala Leu Gly			
260	265	270	
Arg Phe Ala Val Glu Gln Asn Val Asn Asn Arg Thr Val Leu Arg Asp			
275	280	285	
Ala Ile Ala Gly Trp His Glu Thr Gly Glu Ala Val Leu Ala Ala Gly			
290	295	300	
Ala Gly Met Leu Ala Ser Arg Ala Pro Ser Ala Asp Ala Ala Lys Ile			
305	310	315	320
Ala Asp Glu Val Arg Ala Thr Leu Ala Gln Leu His Ala Asn Ala Gly			
325	330	335	
Leu Gly His Asp Ala			
340			

<210> 17
 <211> 267
 <212> DNA
 <213> Xanthobacteria sp.

<220>
 <221> CDS
 <222> (1)..(267)

<400> 17
 atg tct ttg ttc ccc atc gtc ggc cgc ttc gtc ggg gat ttc gtc ccc 48
 Met Ser Leu Phe Pro Ile Val Gly Arg Phe Val Gly Asp Phe Val Pro
 1 5 10 15

 cac ctg gtc gtc gac acc tct gac acc atc gat cag atc gcc gag 96
 His Leu Val Ala Val Asp Thr Ser Asp Thr Ile Asp Gln Ile Ala Glu
 20 25 30

 aag gtg gcg gtc cac acg gtc ggg cgg cgc ttg ccg ccc gat ccc acc 144
 Lys Val Ala Val His Thr Val Gly Arg Arg Leu Pro Pro Asp Pro Thr
 35 40 45

 gcc acc ggc tat gag gtc ctc ctc gac ggc gag acc ctg gac ggg ggc 192
 Ala Thr Gly Tyr Glu Val Leu Leu Asp Gly Glu Thr Leu Asp Gly Gly
 50 55 60

 gcc acc ctg gag gcc atc atg acc aag cgc gag atg ctg ccc ctg cag 240
 Ala Thr Leu Glu Ala Ile Met Thr Lys Arg Glu Met Leu Pro Leu Gln
 65 70 75 80

 tgg ttc gac gtc agg ttc aag aag tga 267
 Trp Phe Asp Val Arg Phe Lys Lys
 85

<210> 18
 <211> 88
 <212> PRT
 <213> Xanthobacteria sp.

<400> 18

 Met Ser Leu Phe Pro Ile Val Gly Arg Phe Val Gly Asp Phe Val Pro 15
 1 5 10 15

 His Leu Val Ala Val Asp Thr Ser Asp Thr Ile Asp Gln Ile Ala Glu
 20 25 30

 Lys Val Ala Val His Thr Val Gly Arg Arg Leu Pro Pro Asp Pro Thr
 35 40 45

 Ala Thr Gly Tyr Glu Val Leu Leu Asp Gly Glu Thr Leu Asp Gly Gly
 50 55 60

 Ala Thr Leu Glu Ala Ile Met Thr Lys Arg Glu Met Leu Pro Leu Gln
 65 70 75 80

 Trp Phe Asp Val Arg Phe Lys Lys
 85

<210> 19
 <211> 1584
 <212> DNA
 <213> Methylococcus capsulatus

<220>
 <221> CDS
 <222> (1)...(1584)

 <400> 19
 atg gca ctt agc acc gca acc aag gcc gcg acg gac ggc ctg gct gcc 48
 Met Ala Leu Ser Thr Ala Thr Lys Ala Ala Thr Asp Ala Leu Ala Ala
 1 5 10 15

 aat cgg gca ccc acc agc gtc aat gca cag gaa gtc cac cgt tgg ctc 96
 Asn Arg Ala Pro Thr Ser Val Asn Ala Gln Glu Val His Arg Trp Leu
 20 25 30

 cag agc ttc aac tgg gat ttc aag aac aac cgg acc aag tac gcc acc 144
 Gln Ser Phe Asn Trp Asp Phe Lys Asn Asn Arg Thr Lys Tyr Ala Thr
 35 40 45

 aag tac aag atg gcg aac gag acc aag gaa cag ttc aag ctg atc gcc 192

Lys	Tyr	Lys	Met	Ala	Asn	Glu	Thr	Lys	Glu	Gln	Phe	Lys	Leu	Ile	Ala	
50				55				60								
aag gaa tat gcg cgc atg gag gca gtc aag gac gaa agg cag ttc ggt															240	
Lys	Glu	Tyr	Ala	Arg	Met	Glu	Ala	Val	Lys	Asp	Glu	Arg	Gln	Phe	Gly	
65				70			75		80							
agc ctg cag gat gcg ctg acc cgc ctc aac gcc ggt gtt cgc gtt cat															288	
Ser	Leu	Gln	Asp	Ala	Leu	Thr	Arg	Leu	Asn	Ala	Gly	Val	Arg	Val	His	
				85			90		95							
ccg aag tgg aac gag acc atg aaa gtg gtt tcg aac ttc ctg gaa gtg															336	
Pro	Lys	Trp	Asn	Glu	Thr	Met	Lys	Val	Val	Ser	Asn	Phe	Leu	Glu	Val	
	100			105				110								
ggc gaa tac aac gcc atc gcc gct acc ggg atg ctg tgg gat tcc gcc															384	
Gly	Glu	Tyr	Asn	Ala	Ile	Ala	Ala	Thr	Gly	Met	Leu	Trp	Asp	Ser	Ala	
	115			120			125									
cag gcg gaa cag aac ggc tat ctg gcc cag gtg ttg gat gaa															432	
Gln	Ala	Ala	Glu	Gln	Lys	Asn	Gly	Tyr	Leu	Ala	Gln	Val	Leu	Asp	Glu	
	130			135			140									
atc cgc cac acc cac cag tgt gcc tac gtc aac tac tac ttc gcg aag															480	
Ile	Arg	His	Thr	His	Gln	Cys	Ala	Tyr	Val	Asn	Tyr	Tyr	Phe	Ala	Lys	
	145			150			155		160							
aac ggc cag gac ccg gcc ggt cac aac gat gct cgc cgc acc cgt acc															528	
Asn	Gly	Gln	Asp	Pro	Ala	Gly	His	Asn	Asp	Ala	Arg	Arg	Thr	Arg	Thr	
	165			170			175									
atc ggt ccg ctg tgg aag ggc atg aag cgc gtg ttt tcc gac ggc ttc															576	
Ile	Gly	Pro	Leu	Trp	Lys	Gly	Met	Lys	Arg	Val	Phe	Ser	Asp	Gly	Phe	
	180			185			190									
att tcc ggc gac gcc gtg gaa tgc tcc ctc aac ctg cag ctg gtc ggt															624	
Ile	Ser	Gly	Asp	Ala	Val	Glu	Cys	Ser	Leu	Asn	Leu	Gln	Leu	Val	Gly	
	195			200			205									
gag gcc tgc ttc acc aat ccg ctg atc gtc gca gtg acc gaa tgg gct															672	
Glu	Ala	Cys	Phe	Thr	Asn	Pro	Leu	Ile	Val	Ala	Val	Thr	Glu	Trp	Ala	
	210			215			220									
gcc gcc aac ggc gat gaa atc acc ccg acg gtg ttc ctg tcg atc gag															720	
Ala	Ala	Asn	Gly	Asp	Glu	Ile	Thr	Pro	Thr	Val	Phe	Leu	Ser	Ile	Glu	
	225			230			235		240							
acc gac gaa ctg cgc cac atg gcc aac ggt tac cag acc gtc gtt tcc															768	
Thr	Asp	Glu	Leu	Arg	His	Met	Ala	Asn	Gly	Tyr	Gln	Thr	Val	Val	Ser	
	245			250			255		255							
atc gcc aac gat ccg gct tcc gcc aag tat ctc aac acg gac ctg aac															816	
Ile	Ala	Asn	Asp	Pro	Ala	Ser	Ala	Lys	Tyr	Leu	Asn	Thr	Asp	Leu	Asn	
	260			265			270									
aac gcc ttc tgg acc cag cag aag tac ttc acg ccg gtg ttg ggc atg															864	
Asn	Ala	Phe	Trp	Thr	Gln	Gln	Lys	Tyr	Phe	Thr	Pro	Val	Leu	Gly	Met	
	275			280			285									
ctg ttc gag tat ggc tcc aag ttc aag gtc gag ccg tgg gtc aag acg															912	
Leu	Phe	Glu	Tyr	Gly	Ser	Lys	Phe	Lys	Val	Glu	Pro	Trp	Val	Lys	Thr	
	290			295			300									
tgg gac cgc tgg gtc tac gag gac tgg ggc atc tgg atc ggc cgt															960	
Trp	Asp	Arg	Trp	Val	Tyr	Glu	Asp	Trp	Gly	Gly	Ile	Trp	Ile	Gly	Arg	
	305			310			315		320							
ctg ggc aag tac ggg gtg gag tcg ccg cgc agc ctc aag gac gcc aag															1008	
Leu	Gly	Lys	Tyr	Gly	Val	Glu	Ser	Pro	Arg	Ser	Leu	Lys	Asp	Ala	Lys	
	325			330			335		335							
cag gac gct tac tgg gct cac cac gac ctg tat ctg ctg gct tat gcg															1056	
Gln	Asp	Ala	Tyr	Trp	Ala	His	His	Asp	Leu	Tyr	Leu	Leu	Ala	Tyr	Ala	
	340			345			350		350							
ctg tgg ccg acc ggc ttc ttc cgt ctg gcg ctg ccg gat cag gaa gaa															1104	

Leu Trp Pro Thr Gly Phe Phe Arg Leu Ala Leu Pro Asp Gln Glu Glu			
355	360	365	
atg gag tgg ttc gag gcc aac tac ccc ggc tgg tac gac cac tac ggc		1152	
Met Glu Trp Phe Glu Ala Asn Tyr Pro Gly Trp Tyr Asp His Tyr Gly			
370	375	380	
aag atc tac gag gaa tgg cgc gcc cgc ggt tgc gag gat ccg tcc tcg		1200	
Lys Ile Tyr Glu Glu Trp Arg Ala Arg Gly Cys Glu Asp Pro Ser Ser			
385	390	395	400
ggc ttc atc ccg ctg atg tgg ttc atc gaa aac aac cat ccc atc tac		1248	
Gly Phe Ile Pro Leu Met Trp Phe Ile Glu Asn Asn His Pro Ile Tyr			
405	410	415	
atc gat cgc gtg tcg caa gtg ccg ttc tgc ccg agc ttg gcc aag ggc		1296	
Ile Asp Arg Val Ser Gln Val Pro Phe Cys Pro Ser Leu Ala Lys Gly			
420	425	430	
gcc agc acc ctg cgc gtg cac gag tac aac ggc gag atg cac acc ttc		1344	
Ala Ser Thr Leu Arg Val His Glu Tyr Asn Gly Glu Met His Thr Phe			
435	440	445	
agc gac cag tgg ggc gag cgc atg tgg ctg gcc gag ccg gag cgc tac		1392	
Ser Asp Gln Trp Gly Glu Arg Met Trp Leu Ala Glu Pro Glu Arg Tyr			
450	455	460	
gag tgc cag aac atc ttc gaa cag tac gaa gga cgc gaa ctg tcg gaa		1440	
Glu Cys Gln Asn Ile Phe Glu Gln Tyr Glu Gly Arg Glu Leu Ser Glu			
465	470	475	480
gtg atc gcc gaa ctg cac ggg ctg cgc agt gat ggc aag acc ctg atc		1488	
Val Ile Ala Glu Leu His Gly Leu Arg Ser Asp Gly Lys Thr Leu Ile			
485	490	495	
gcc cag ccg cat gtc cgt ggc gac aag ctg tgg acg ttg gac gat atc		1536	
Ala Gln Pro His Val Arg Gly Asp Lys Leu Trp Thr Leu Asp Asp Ile			
500	505	510	
aaa cgc ctg aac tgc gtc ttc aag aac ccg gtg aag gca ttc aat tga		1584	
Lys Arg Leu Asn Cys Val Phe Lys Asn Pro Val Lys Ala Phe Asn			
515	520	525	

<210> 20
 <211> 527
 <212> PRT
 <213> Methylococcus capsulatus

<400> 20

Met Ala Leu Ser Thr Ala Thr Lys Ala Ala Thr Asp Ala Leu Ala Ala			
1	5	10	15
Asn Arg Ala Pro Thr Ser Val Asn Ala Gln Glu Val His Arg Trp Leu			
20	25	30	
Gln Ser Phe Asn Trp Asp Phe Lys Asn Asn Arg Thr Lys Tyr Ala Thr			
35	40	45	
Lys Tyr Lys Met Ala Asn Glu Thr Lys Glu Gln Phe Lys Leu Ile Ala			
50	55	60	
Lys Glu Tyr Ala Arg Met Glu Ala Val Lys Asp Glu Arg Gln Phe Gly			
65	70	75	80
Ser Leu Gln Asp Ala Leu Thr Arg Leu Asn Ala Gly Val Arg Val His			
85	90	95	
Pro Lys Trp Asn Glu Thr Met Lys Val Val Ser Asn Phe Leu Glu Val			
100	105	110	
Gly Glu Tyr Asn Ala Ile Ala Ala Thr Gly Met Leu Trp Asp Ser Ala			
115	120	125	
Gln Ala Ala Glu Gln Lys Asn Gly Tyr Leu Ala Gln Val Leu Asp Glu			

130	135	140	
Ile Arg His Thr His Gln Cys Ala Tyr Val Asn Tyr Tyr Phe Ala Lys			
145	150	155	160
Asn Gly Gln Asp Pro Ala Gly His Asn Asp Ala Arg Arg Thr Arg Thr			
165	170	175	
Ile Gly Pro Leu Trp Lys Gly Met Lys Arg Val Phe Ser Asp Gly Phe			
180	185	190	
Ile Ser Gly Asp Ala Val Glu Cys Ser Leu Asn Leu Gln Leu Val Gly			
195	200	205	
Glu Ala Cys Phe Thr Asn Pro Leu Ile Val Ala Val Thr Glu Trp Ala			
210	215	220	
Ala Ala Asn Gly Asp Glu Ile Thr Pro Thr Val Phe Leu Ser Ile Glu			
225	230	235	240
Thr Asp Glu Leu Arg His Met Ala Asn Gly Tyr Gln Thr Val Val Ser			
245	250	255	
Ile Ala Asn Asp Pro Ala Ser Ala Lys Tyr Leu Asn Thr Asp Leu Asn			
260	265	270	
Asn Ala Phe Trp Thr Gln Gln Lys Tyr Phe Thr Pro Val Leu Gly Met			
275	280	285	
Leu Phe Glu Tyr Gly Ser Lys Phe Lys Val Glu Pro Trp Val Lys Thr			
290	295	300	
Trp Asp Arg Trp Val Tyr Glu Asp Trp Gly Gly Ile Trp Ile Gly Arg			
305	310	315	320
Leu Gly Lys Tyr Gly Val Glu Ser Pro Arg Ser Leu Lys Asp Ala Lys			
325	330	335	
Gln Asp Ala Tyr Trp Ala His His Asp Leu Tyr Leu Leu Ala Tyr Ala			
340	345	350	
Leu Trp Pro Thr Gly Phe Arg Leu Ala Leu Pro Asp Gln Glu Glu			
355	360	365	
Met Glu Trp Phe Glu Ala Asn Tyr Pro Gly Trp Tyr Asp His Tyr Gly			
370	375	380	
Lys Ile Tyr Glu Glu Trp Arg Ala Arg Gly Cys Glu Asp Pro Ser Ser			
385	390	395	400
Gly Phe Ile Pro Leu Met Trp Phe Ile Glu Asn Asn His Pro Ile Tyr			
405	410	415	
Ile Asp Arg Val Ser Gln Val Pro Phe Cys Pro Ser Leu Ala Lys Gly			
420	425	430	
Ala Ser Thr Leu Arg Val His Glu Tyr Asn Gly Glu Met His Thr Phe			
435	440	445	
Ser Asp Gln Trp Gly Glu Arg Met Trp Leu Ala Glu Pro Glu Arg Tyr			
450	455	460	
Glu Cys Gln Asn Ile Phe Glu Gln Tyr Glu Gly Arg Glu Leu Ser Glu			
465	470	475	480
Val Ile Ala Glu Leu His Gly Leu Arg Ser Asp Gly Lys Thr Leu Ile			
485	490	495	
Ala Gln Pro His Val Arg Gly Asp Lys Leu Trp Thr Leu Asp Asp Ile			
500	505	510	
Lys Arg Leu Asn Cys Val Phe Lys Asn Pro Val Lys Ala Phe Asn			
515	520	525	

<211> 1170

<212> DNA

<213> *Methylococcus capsulatus*

<220>

<221> CDS

<222> (1)..(1170)

<400> 21

atg	agc	atg	tta	gga	gaa	aga	cgc	cgc	ggt	ctg	acc	gat	ccg	gaa	atg	48
Met	Ser	Met	Leu	Gly	Glu	Arg	Arg	Arg	Gly	Leu	Thr	Asp	Pro	Glu	Met	
1			5						10					15		

gcg	gcc	gtc	att	ttg	aag	gcg	ctt	cct	gaa	gct	ccg	ctg	gac	ggc	aac	96
Ala	Ala	Val	Ile	Leu	Lys	Ala	Leu	Pro	Glu	Ala	Pro	Leu	Asp	Gly	Asn	
20			25						30							

aac	aag	atg	ggt	tat	ttc	gtc	acc	ccc	cgc	tgg	aaa	cgc	ttg	acg	gaa	144
Asn	Lys	Met	Gly	Tyr	Phe	Val	Thr	Pro	Arg	Trp	Lys	Arg	Leu	Thr	Glu	
35			40						45							

tat	gaa	gcc	ctg	acc	gtt	tat	gcg	cag	ccc	aac	gcc	gac	tgg	atc	gcc	192
Tyr	Glu	Ala	Leu	Thr	Val	Tyr	Ala	Gln	Pro	Asn	Ala	Asp	Trp	Ile	Ala	
50			55						60							

ggc	ggc	ctg	gac	tgg	ggc	gac	tgg	acc	cag	aaa	ttc	cac	ggc	ggc	cgc	240
Gly	Gly	Leu	Asp	Trp	Gly	Asp	Trp	Thr	Gln	Lys	Phe	His	Gly	Gly	Arg	
65			70						75			80				

cct	tcc	tgg	ggc	aac	gag	acc	acg	gag	ctg	cgc	acc	gtc	gac	tgg	ttc	288
Pro	Ser	Trp	Gly	Asn	Glu	Thr	Glu	Leu	Arg	Thr	Val	Asp	Trp	Phe		
85			90						95							

aag	cac	cgt	gac	ccg	ctc	cgc	cgt	tgg	cat	gcg	ccg	tac	gtc	aag	gac	336
Lys	His	Arg	Asp	Pro	Leu	Arg	Arg	Trp	His	Ala	Pro	Tyr	Val	Lys	Asp	
100			105						110							

aag	gcc	gag	gaa	tgg	cgc	tac	acc	gac	cgc	ttc	ctg	cag	ggt	tac	tcc	384
Lys	Ala	Glu	Glu	Trp	Arg	Tyr	Thr	Asp	Arg	Phe	Leu	Gln	Gly	Tyr	Ser	
115			120						125							

gcc	gac	ggt	cag	atc	cg	g	atg	aac	ccg	acc	tgg	cgg	gac	gag	ttc	432
Ala	Asp	Gly	Gly	Ile	Arg	Ala	Met	Asn	Pro	Thr	Trp	Arg	Asp	Glu	Phe	
130			135						140							

atc	aac	cgg	tat	tgg	ggc	ttc	ctg	ttc	aac	gaa	tac	gga	ttg	ttc	480
Ile	Asn	Arg	Tyr	Trp	Gly	Ala	Phe	Leu	Phe	Asn	Glu	Tyr	Gly	Leu	Phe
145			150						155			160			

aac	gct	cat	tcg	cag	ggc	gcc	cg	gag	g	cg	ctg	tcg	gac	gta	acc	528
Asn	Ala	His	Ser	Gln	Gly	Ala	Arg	Glu	Ala	Leu	Ser	Asp	Val	Thr	Arg	
165			170						175							

gtc	agc	ctg	gct	ttc	tgg	ggc	ttc	gac	aag	atc	gac	atc	gcc	cag	atg	576
Val	Ser	Leu	Ala	Phe	Trp	Gly	Phe	Asp	Lys	Ile	Asp	Ile	Ala	Gln	Met	
180			185						190							

atc	caa	ctc	gaa	cg	gg	ttc	ctc	gcc	aag	atc	gta	ccc	gg	ttc	gac	624
Ile	Gln	Leu	Glu	Arg	Gly	Phe	Leu	Ala	Lys	Ile	Val	Pro	Gly	Phe	Asp	
195			200						205							

gag	tcc	aca	g	cg	gt	cc	aag	g	cc	g	ttg	ac	aa	gg	g	tc	672
Glu	Ser	Thr	Ala	Val	Pro	Lys	Ala	Glu	Trp	Thr	Asn	Gly	Glu	Val	Tyr		
210			215						220								

aag	agc	gcc	cgt	ctg	g	cc	gt	g	aa	gg	atc	g	cc	gg	ttc	720
Lys	Ser	Ala	Arg	Leu	Ala	Val	Glu	Gly	Leu	Trp	Gln	Glu	Val	Phe	Asp	
225			230						235			240				

tgg	aa	g	agc	g	ct	tc	gt	ca	g	cc	tt	g	cc	tt	g	768
Trp	Asn	Glu	Ser	Ala	Phe	Ser	Val	His	Ala	Val	Tyr	Asp	Ala	Leu	Phe	
245			250						255							

ggt	cag	ttc	gtc	cgc	cgc	gag	ttc	ttt	cag	ccg	ctg	gct	ccc	cgc	ttc	816
Gly	Gln	Phe	Val	Arg	Arg	Glu	Phe	Phe	Gln	Arg	Leu	Ala	Pro	Arg	Phe	

260	265	270	864
ggc gac aat ctg acg cca ttc ttc atc aac cag gcc cag aca tac ttc			
Gly Asp Asn Leu Thr Pro Phe Phe Ile Asn Gln Ala Gln Thr Tyr Phe			
275	280	285	
cag atc gcc aag cag ggc gta cag gat ctg tat tac aac tgt ctg ggt			912
Gln Ile Ala Lys Gln Gly Val Gln Asp Leu Tyr Tyr Asn Cys Leu Gly			
290	295	300	
gac gat ccg gag ttc agc gat tac aac cgt acc gtg atg cgc aac tgg			960
Asp Asp Pro Glu Phe Ser Asp Tyr Asn Arg Thr Val Met Arg Asn Trp			
305	310	315	320
acc ggc aag tgg ctg gag ccc acg atc gcc gct ctg cgc gac ttc atg			1008
Thr Gly Lys Trp Leu Glu Pro Thr Ile Ala Ala Leu Arg Asp Phe Met			
325	330	335	
ggg ctg ttt gcg aag ctg ccg gcg ggc acc act gac aag gaa gaa atc			1056
Gly Leu Phe Ala Lys Leu Pro Ala Gly Thr Thr Asp Lys Glu Glu Ile			
340	345	350	
acc gcg tcc ctg tac cgg gtg gtc gac gac tgg atc gag gac tac gcc			1104
Thr Ala Ser Leu Tyr Arg Val Val Asp Asp Trp Ile Glu Asp Tyr Ala			
355	360	365	
agc gcg atc gac ttc aag gcg gac cgc gat cag atc gtt aaa gcg gtt			1152
Ser Ala Ile Asp Phe Lys Ala Asp Arg Asp Gln Ile Val Lys Ala Val			
370	375	380	
ctg gca gga ttg aaa taa			1170
Leu Ala Gly Leu Lys			
385			
<210> 22			
<211> 389			
<212> PRT			
<213> Methyllococcus capsulatus			
<400> 22			
Met Ser Met Leu Gly Glu Arg Arg Arg Gly Leu Thr Asp Pro Glu Met			
1	5	10	15
Ala Ala Val Ile Leu Lys Ala Leu Pro Glu Ala Pro Leu Asp Gly Asn			
20	25	30	
Asn Lys Met Gly Tyr Phe Val Thr Pro Arg Trp Lys Arg Leu Thr Glu			
35	40	45	
Tyr Glu Ala Leu Thr Val Tyr Ala Gln Pro Asn Ala Asp Trp Ile Ala			
50	55	60	
Gly Gly Leu Asp Trp Gly Asp Trp Thr Gln Lys Phe His Gly Gly Arg			
65	70	75	80
Pro Ser Trp Gly Asn Glu Thr Thr Glu Leu Arg Thr Val Asp Trp Phe			
85	90	95	
Lys His Arg Asp Pro Leu Arg Arg Trp His Ala Pro Tyr Val Lys Asp			
100	105	110	
Lys Ala Glu Glu Trp Arg Tyr Thr Asp Arg Phe Leu Gln Gly Tyr Ser			
115	120	125	
Ala Asp Gly Gln Ile Arg Ala Met Asn Pro Thr Trp Arg Asp Glu Phe			
130	135	140	
Ile Asn Arg Tyr Trp Gly Ala Phe Leu Phe Asn Glu Tyr Gly Leu Phe			
145	150	155	160
Asn Ala His Ser Gln Gly Ala Arg Glu Ala Leu Ser Asp Val Thr Arg			
165	170	175	
Val Ser Leu Ala Phe Trp Gly Phe Asp Lys Ile Asp Ile Ala Gln Met			

180	185	190	
Ile Gln Leu Glu Arg Gly Phe Leu Ala Lys Ile Val Pro Gly Phe Asp			
195	200	205	
Glu Ser Thr Ala Val Pro Lys Ala Glu Trp Thr Asn Gly Glu Val Tyr			
210	215	220	
Lys Ser Ala Arg Leu Ala Val Glu Gly Leu Trp Gln Glu Val Phe Asp			
225	230	235	240
Trp Asn Glu Ser Ala Phe Ser Val His Ala Val Tyr Asp Ala Leu Phe			
245	250	255	
Gly Gln Phe Val Arg Arg Glu Phe Phe Gln Arg Leu Ala Pro Arg Phe			
260	265	270	
Gly Asp Asn Leu Thr Pro Phe Phe Ile Asn Gln Ala Gln Thr Tyr Phe			
275	280	285	
Gln Ile Ala Lys Gln Gly Val Gln Asp Leu Tyr Tyr Asn Cys Leu Gly			
290	295	300	
Asp Asp Pro Glu Phe Ser Asp Tyr Asn Arg Thr Val Met Arg Asn Trp			
305	310	315	320
Thr Gly Lys Trp Leu Glu Pro Thr Ile Ala Ala Leu Arg Asp Phe Met			
325	330	335	
Gly Leu Phe Ala Lys Leu Pro Ala Gly Thr Thr Asp Lys Glu Glu Ile			
340	345	350	
Thr Ala Ser Leu Tyr Arg Val Val Asp Asp Trp Ile Glu Asp Tyr Ala			
355	360	365	
Ser Ala Ile Asp Phe Lys Ala Asp Arg Asp Gln Ile Val Lys Ala Val			
370	375	380	
Leu Ala Gly Leu Lys			
385			

<210> 23
<211> 513
<212> DNA
<213> *Methylococcus capsulatus*

<220>
<221> CDS
<222> (1)..(513)

<400>	23															
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Met	Ala	Lys	Leu	Gly	Ile	His	Ser	Asn	Asp	Thr	Arg	Asp	Ala	Trp	Val	
1	5								10					15		
aac	aag	atc	gcg	cag	ctc	aac	acc	ctg	gaa	aaa	gcg	gcc	gag	atg	ctg	96
Asn	Lys	Ile	Ala	Gln	Leu	Asn	Thr	Leu	Glu	Lys	Ala	Ala	Glu	Met	Leu	
20								25					30			
aag	cag	ttc	cg	atg	gac	cac	acc	acg	ccg	ttc	cg	aac	agc	tac	gaa	144
Lys	Gln	Phe	Arg	Met	Asp	His	Thr	Thr	Pro	Phe	Arg	Asn	Ser	Tyr	Glu	
35							40					45				
ctg	gac	aac	gac	ta	ctc	tgg	atc	gag	gcc	aag	ctc	gaa	gag	aag	gtc	192
Leu	Asp	Asn	Asp	Tyr	Leu	Trp	Ile	Glu	Ala	Lys	Leu	Glu	Glu	Lys	Val	
50					55						60					
gcc	gtc	ctc	aag	gca	cg	gcc	ttc	aac	gag	gtg	gac	ttc	cgt	cat	aag	240
Ala	Val	Leu	Lys	Ala	Arg	Ala	Phe	Asn	Glu	Val	Asp	Phe	Arg	His	Lys	
65								70			75		80			
acc	gct	ttc	ggc	gag	gat	gcc	aag	tcc	gtt	ctg	gac	ggc	acc	gtc	g	288
Thr	Ala	Phe	Gly	Glu	Asp	Ala	Lys	Ser	Val	Leu	Asp	Gly	Thr	Val	Ala	
85								90					95			

aag atg aac gcg gcc aag gac aag tgg gag gcg gag aag atc cat atc Lys Met Asn Ala Ala Lys Asp Lys Trp Glu Ala Glu Lys Ile His Ile 100 105 110	336
ggt ttc cgc cag gcc tac aag ccg ccg atc atg ccg gtg aac tat ttc Gly Phe Arg Gln Ala Tyr Lys Pro Pro Ile Met Pro Val Asn Tyr Phe 115 120 125	384
ctg gac ggc gag cgt cag ttg ggg acc ccg ctg atg gaa ctg cgc aac Leu Asp Gly Glu Arg Gln Leu Gly Thr Arg Leu Met Glu Leu Arg Asn 130 135 140	432
ctc aac tac tac gac acg ccg ctg gaa gaa ctg cgc aaa cag cgc ggt Leu Asn Tyr Tyr Asp Thr Pro Leu Glu Leu Arg Lys Gln Arg Gly 145 150 155 160	480
gtg cgg gtg cat ctg cag tcg ccg cac tga Val Arg Val Val His Leu Gln Ser Pro His 165 170	513

<210> 24
<211> 170
<212> PRT
<213> *Methylococcus capsulatus*

<400> 24

Met Ala Lys Leu Gly Ile His Ser Asn Asp Thr Arg Asp Ala Trp Val 1 5 10 15
Asn Lys Ile Ala Gln Leu Asn Thr Leu Glu Lys Ala Ala Glu Met Leu 20 25 30
Lys Gln Phe Arg Met Asp His Thr Thr Pro Phe Arg Asn Ser Tyr Glu 35 40 45
Leu Asp Asn Asp Tyr Leu Trp Ile Glu Ala Lys Leu Glu Glu Lys Val 50 55 60
Ala Val Leu Lys Ala Arg Ala Phe Asn Glu Val Asp Phe Arg His Lys 65 70 75 80
Thr Ala Phe Gly Glu Asp Ala Lys Ser Val Leu Asp Gly Thr Val Ala 85 90 95
Lys Met Asn Ala Ala Lys Asp Lys Trp Glu Ala Glu Lys Ile His Ile 100 105 110
Gly Phe Arg Gln Ala Tyr Lys Pro Pro Ile Met Pro Val Asn Tyr Phe 115 120 125
Leu Asp Gly Glu Arg Gln Leu Gly Thr Arg Leu Met Glu Leu Arg Asn 130 135 140
Leu Asn Tyr Tyr Asp Thr Pro Leu Glu Leu Arg Lys Gln Arg Gly 145 150 155 160
Val Arg Val Val His Leu Gln Ser Pro His 165 170

<210> 25
<211> 1206
<212> DNA
<213> *Pseudomonas oleovorans*

<220>
<221> CDS
<222> (1)...(1206)

<400> 25

atg ctt gag aaa cac aga gtt ctg gat tcc gct cca gag tac gta gat Met Leu Glu Lys His Arg Val Leu Asp Ser Ala Pro Glu Tyr Val Asp	48
--	----

1	5	10	15	
aaa aag aaa tat ctc tgg ata cta tca act ttg tgg ccg gct act ccg				96
Lys Lys Lys Tyr Leu Trp Ile Leu Ser Thr Leu Trp Pro Ala Thr Pro				
20	25	30		
atg atc gga atc tgg ctt gca aat gaa act ggt tgg ggg att ttt tat				144
Met Ile Gly Ile Trp Leu Ala Asn Glu Thr Gly Trp Gly Ile Phe Tyr				
35	40	45		
ggg ctg gta ttg ctc gta tgg tac ggc gca ctt cca ttg ctt gat gcg				192
Gly Leu Val Leu Leu Val Trp Tyr Gly Ala Leu Pro Leu Leu Asp Ala				
50	55	60		
atg ttt ggt gag gac ttt aat aat ccg cct gaa gaa gtg gtg ccg aaa				240
Met Phe Gly Glu Asp Phe Asn Asn Pro Pro Glu Glu Val Val Pro Lys				
65	70	75	80	
cta gag aag gag cgg tac tat cga gtt ttg aca tat cta aca gtt cct				288
Leu Glu Lys Glu Arg Tyr Tyr Arg Val Leu Thr Tyr Leu Thr Val Pro				
85	90	95		
atg cat tac gct gca tta att gtg tca gca tgg tgg gtc gga act cag				336
Met His Tyr Ala Ala Leu Ile Val Ser Ala Trp Trp Val Gly Thr Gln				
100	105	110		
cca atg tct tgg ctt gaa att ggt gcg ctt gcc ttg tca ctg ggt atc				384
Pro Met Ser Trp Leu Glu Ile Gly Ala Leu Ala Ser Leu Gly Ile				
115	120	125		
gtg aac gga cta gcg ctc aat aca gga cac gaa ctc ggt cac aag aag				432
Val Asn Gly Leu Ala Leu Asn Thr Gly His Glu Leu Gly His Lys Lys				
130	135	140		
gag act ttt gat cgt tgg atg gcc aaa att gtg ttg gct gtc gta ggg				480
Glu Thr Phe Asp Arg Trp Met Ala Lys Ile Val Leu Ala Val Val Gly				
145	150	155	160	
tac ggt cac ttc ttt att gag cat aat aag ggt cat cac cgt gat gtc				528
Tyr Gly His Phe Phe Ile Glu His Asn Lys Gly His His Arg Asp Val				
165	170	175		
gct aca ccg atg gat cct gca aca tcc cgg atg gga gaa agc att tat				576
Ala Thr Pro Met Asp Pro Ala Thr Ser Arg Met Gly Glu Ser Ile Tyr				
180	185	190		
aag ttt tca atc cgt gag atc cca gga gca ttt att cgt gct tgg ggg				624
Lys Phe Ser Ile Arg Glu Ile Pro Gly Ala Phe Ile Arg Ala Trp Gly				
195	200	205		
ctt gag gaa caa cgc ctt tcg cgc cgt ggc caa agc gtt tgg agt ttc				672
Leu Glu Gln Arg Leu Ser Arg Arg Gly Gln Ser Val Trp Ser Phe				
210	215	220		
gat aat gaa atc ctc caa cca atg atc atc aca gtt att ctt tac gcc				720
Asp Asn Glu Ile Leu Gln Pro Met Ile Ile Thr Val Ile Leu Tyr Ala				
225	230	235	240	
gtt ctc ctt gcc ttg ttt gga cct aag atg ctg gtg ttc ctg ccg att				768
Val Leu Leu Ala Leu Phe Gly Pro Lys Met Leu Val Phe Leu Pro Ile				
245	250	255		
caa atg gct ttc ggt tgg tgg cag ctg acc agt gcg aac tat att gaa				816
Gln Met Ala Phe Gly Trp Trp Gln Leu Thr Ser Ala Asn Tyr Ile Glu				
260	265	270		
cat tac ggc ttg ctc cgt caa aaa atg gag gac ggt cga tat gag cat				864
His Tyr Gly Leu Leu Arg Gln Lys Met Glu Asp Gly Arg Tyr Glu His				
275	280	285		
caa aag ccg cac cat tct tgg aat agt aat cac atc gtc tct aat cta				912
Gln Lys Pro His His Ser Trp Asn Ser Asn His Ile Val Ser Asn Leu				
290	295	300		
gtg ctg ttc cac ctt cag ccg cac tcg gat cac cac gcg cat cca aca				960
Val Leu Phe His Leu Gln Arg His Ser Asp His His Ala His Pro Thr				

305	310	315	320	
cgt tct tat cag tca ctt cgg gat ttt ccc ggc ctg ccg gct ctt ccg Arg Ser Tyr Gln Ser Leu Arg Asp Phe Pro Gly Leu Pro Ala Leu Pro				1008
325		330		335
acg ggt tac cct ggt gca ttt ttg atg gcg atg att cct cag tgg ttt Thr Gly Tyr Pro Gly Ala Phe Leu Met Ala Met Ile Pro Gln Trp Phe				1056
340		345		350
aga tca gtt atg gat ccc aag gta gta gat tgg gct ggt gac ctt Arg Ser Val Met Asp Pro Lys Val Val Asp Trp Ala Gly Gly Asp Leu				1104
355		360		365
aat aag atc caa att gat gat tcg atg cga gaa acc tat ttg aaa aaa Asn Lys Ile Gln Ile Asp Asp Ser Met Arg Glu Thr Tyr Leu Lys Lys				1152
370		375		380
ttt ggc act agt agt gct ggt cat agt tcg agt acc tct gcg gta gca Phe Gly Thr Ser Ser Ala Gly His Ser Ser Thr Ser Ala Val Ala				1200
385		390		395
tcg tag Ser				1206

<210>	26			
<211>	401			
<212>	PRT			
<213>	Pseudomonas oleovorans			
<400>	26			
Met Leu Glu Lys His Arg Val Leu Asp Ser Ala Pro Glu Tyr Val Asp				
1	5	10	15	
Lys Lys Lys Tyr Leu Trp Ile Leu Ser Thr Leu Trp Pro Ala Thr Pro				
20	25		30	
Met Ile Gly Ile Trp Leu Ala Asn Glu Thr Gly Trp Gly Ile Phe Tyr				
35	40		45	
Gly Leu Val Leu Leu Val Trp Tyr Gly Ala Leu Pro Leu Leu Asp Ala				
50	55		60	
Met Phe Gly Glu Asp Phe Asn Asn Pro Pro Glu Glu Val Val Pro Lys				
65	70	75		80
Leu Glu Lys Glu Arg Tyr Tyr Arg Val Leu Thr Tyr Leu Thr Val Pro				
85		90		95
Met His Tyr Ala Ala Leu Ile Val Ser Ala Trp Trp Val Gly Thr Gln				
100		105		110
Pro Met Ser Trp Leu Glu Ile Gly Ala Leu Ala Leu Ser Leu Gly Ile				
115		120		125
Val Asn Gly Leu Ala Leu Asn Thr Gly His Glu Leu Gly His Lys Lys				
130		135		140
Glu Thr Phe Asp Arg Trp Met Ala Lys Ile Val Leu Ala Val Val Gly				
145		150		155
Tyr Gly His Phe Phe Ile Glu His Asn Lys Gly His His Arg Asp Val				
165		170		175
Ala Thr Pro Met Asp Pro Ala Thr Ser Arg Met Gly Glu Ser Ile Tyr				
180		185		190
Lys Phe Ser Ile Arg Glu Ile Pro Gly Ala Phe Ile Arg Ala Trp Gly				
195		200		205
Leu Glu Glu Gln Arg Leu Ser Arg Arg Gly Gln Ser Val Trp Ser Phe				
210		215		220

Asp Asn Glu Ile Leu Gln Pro Met Ile Ile Thr Val Ile Leu Tyr Ala
 225 230 235 240

Val Leu Leu Ala Leu Phe Gly Pro Lys Met Leu Val Phe Leu Pro Ile
 245 250 255

Gln Met Ala Phe Gly Trp Trp Gln Leu Thr Ser Ala Asn Tyr Ile Glu
 260 265 270

His Tyr Gly Leu Leu Arg Gln Lys Met Glu Asp Gly Arg Tyr Glu His
 275 280 285

Gln Lys Pro His His Ser Trp Asn Ser Asn His Ile Val Ser Asn Leu
 290 295 300

Val Leu Phe His Leu Gln Arg His Ser Asp His His Ala His Pro Thr
 305 310 315 320

Arg Ser Tyr Gln Ser Leu Arg Asp Phe Pro Gly Leu Pro Ala Leu Pro
 325 330 335

Thr Gly Tyr Pro Gly Ala Phe Leu Met Ala Met Ile Pro Gln Trp Phe
 340 345 350

Arg Ser Val Met Asp Pro Lys Val Val Asp Trp Ala Gly Gly Asp Leu
 355 360 365

Asn Lys Ile Gln Ile Asp Asp Ser Met Arg Glu Thr Tyr Leu Lys Lys
 370 375 380

Phe Gly Thr Ser Ser Ala Gly His Ser Ser Ser Thr Ser Ala Val Ala
 385 390 395 400

Ser

<210> 27

<211> 1560

<212> DNA

<213> Burkholderia cepacia

<220>

<221> CDS

<222> (1)..(1560)

<400> 27

atg gac act tct gtg cag aag aag aaa ctc ggt tta aag aat cgc tac 48
 Met Asp Thr Ser Val Gln Lys Lys Lys Leu Gly Leu Lys Asn Arg Tyr
 1 5 10 15

gca gcg atg acc cgc ggt ctt ggc tgg cag acc agc tac cag ccg atg 96
 Ala Ala Met Thr Arg Gly Leu Gly Trp Gln Thr Ser Tyr Gln Pro Met
 20 25 30

gag aaa gtg ttt ccg tac gac aag tac gaa ggc atc aag atc cac gat 144
 Glu Lys Val Phe Pro Tyr Asp Lys Tyr Glu Gly Ile Lys Ile His Asp
 35 40 45

tgg gat aaa tgg gaa gac ccc ttc cgc ctg acc atg gac gcc tac tgg 192
 Trp Asp Lys Trp Glu Asp Pro Phe Arg Leu Thr Met Asp Ala Tyr Trp
 50 55 60

aaa tat cag ggc gag aag gaa aaa aag ctt tac gcc gtc atc gac gct 240
 Lys Tyr Gln Gly Glu Lys Glu Lys Lys Leu Tyr Ala Val Ile Asp Ala
 65 70 75 80

ttc gcg cag aac aac ggg cag ttg agc att tcc gac gcg cga tat gtc 288
 Phe Ala Gln Asn Asn Gly Gln Leu Ser Ile Ser Asp Ala Arg Tyr Val
 85 90 95

aac gca ctc aag gtg ttt atc cag ggt gtg aca ccg ttg gag tat atg 336
 Asn Ala Leu Lys Val Phe Ile Gln Gly Val Thr Pro Leu Glu Tyr Met
 100 105 110

gca cac cga ggt ttt gcc cac att ggt cggt cat ttt acg ggt gaa ggg Ala His Arg Gly Phe Ala His Ile Gly Arg His Phe Thr Gly Glu Gly 115 120 125	384
gca cgt gtt gct tgc cag atg cag tcc atc gac gag ctg cgt cac ttc Ala Arg Val Ala Cys Gln Met Gln Ser Ile Asp Glu Leu Arg His Phe 130 135 140	432
cag acc gaa atg cat gct ctc tcg cac tac aac aag tat ttt aac ggt Gln Thr Glu Met His Ala Leu Ser His Tyr Asn Lys Tyr Phe Asn Gly 145 150 155 160	480
ctg cac aac tcc atc cat tgg tac gac cggt gtt tgg tat ttg tcg gtg Leu His Asn Ser Ile His Trp Tyr Asp Arg Val Trp Tyr Leu Ser Val 165 170 175	528
ccc aag tca ttt ttt gaa gac gcg gcc acc ggt gga ccg ttc gag ttt Pro Lys Ser Phe Phe Glu Asp Ala Ala Thr Gly Gly Pro Phe Glu Phe 180 185 190	576
ctt acc gcg gtg agc ttt tcg ttc gaa tat gtg ttg acc aac ctg ctg Leu Thr Ala Val Ser Phe Ser Phe Glu Tyr Val Leu Thr Asn Leu Leu 195 200 205	624
ttt gtc ccc ttc atg tcg ggt gct gct tac aac ggg gac atg tct acg Phe Val Pro Phe Met Ser Gly Ala Ala Tyr Asn Gly Asp Met Ser Thr 210 215 220	672
gtc act ttc ggt ttt tcg gcg caa agt gac gaa tcg cgc cac atg aca Val Thr Phe Gly Phe Ser Ala Gln Ser Asp Glu Ser Arg His Met Thr 225 230 235 240	720
ctc ggc atc gaa tgc atc aag ttc atg cta gaa cag gat ccg gac aac Leu Gly Ile Glu Cys Ile Lys Phe Met Leu Glu Gln Asp Pro Asp Asn 245 250 255	768
gtg ccc atc gtg cag cgc tgg atc gac aag tgg ttc tgg cgc ggc tat Val Pro Ile Val Gln Arg Trp Ile Asp Lys Trp Phe Trp Arg Gly Tyr 260 265 270	816
cgg ctg ttg agc atc gtg gcc atg atg cag gac tac atg ctg ccc aac Arg Leu Leu Ser Ile Val Ala Met Met Gln Asp Tyr Met Leu Pro Asn 275 280 285	864
cgg gtg atg agc tgg cgc gag agc tgg gag atg tac gtc gag cag aac Arg Val Met Ser Trp Arg Glu Ser Trp Glu Met Tyr Val Glu Gln Asn 290 295 300	912
ggc ggc gcg ctg ttc aag gat ctt gcg cgt tat ggc atc cgc aag ccc Gly Gly Ala Leu Phe Lys Asp Leu Ala Arg Tyr Gly Ile Arg Lys Pro 305 310 315 320	960
aag ggc tgg gac cag gct tgc gaa ggc aag gac cac atc agc cat cag Lys Gly Trp Asp Gln Ala Cys Glu Gly Lys Asp His Ile Ser His Gln 325 330 335	1008
acc ttc gcc gta ttc tat aac tat aac gcc gcg gcc ccc atc cac acc Thr Phe Ala Val Phe Tyr Asn Tyr Asn Ala Ala Pro Ile His Thr 340 345 350	1056
tgg gtt ccc aca aaa gaa gaa atg gga tgg ctg tcg gag aag tac ccc Trp Val Pro Thr Lys Glu Glu Met Gly Trp Leu Ser Glu Lys Tyr Pro 355 360 365	1104
gag acg ttc gac aag tat tac cgt ccg cgt tgg gac tac tgg cgc gag Glu Thr Phe Asp Lys Tyr Tyr Arg Pro Arg Trp Asp Tyr Trp Arg Glu 370 375 380	1152
cag gcc gcc aag ggc aac cgt ttc tac aac aag acg ctg ccg atg ctc Gln Ala Ala Lys Gly Asn Arg Phe Tyr Asn Lys Thr Leu Pro Met Leu 385 390 395 400	1200
tgc act acc tgc cag att ccg atg ata ttc acc gag cct ggc gac gca Cys Thr Thr Cys Gln Ile Pro Met Ile Phe Thr Glu Pro Gly Asp Ala 405 410 415	1248

acc aag atc tgc tat cgc gag tcg gcc tac ctc ggc gac aag tat cac	1296
Thr Lys Ile Cys Tyr Arg Glu Ser Ala Tyr Leu Gly Asp Lys Tyr His	
420 425 430	
ttc tgc agc gac cac tgc aag gag att ttt gac aac gaa ccc gaa aag	1344
Phe Cys Ser Asp His Cys Lys Glu Ile Phe Asp Asn Glu Pro Glu Lys	
435 440 445	
ttc gtg cag tca tgg ctt ccg ccg cag caa gtg tat caa gga aac tgt	1392
Phe Val Gln Ser Trp Leu Pro Pro Gln Gln Val Tyr Gln Gly Asn Cys	
450 455 460	
ttc aag ccg gat gcc gat ccg acc aag gag ggt ttt gat ccc ttg atg	1440
Phe Lys Pro Asp Ala Asp Pro Thr Lys Glu Gly Phe Asp Pro Leu Met	
465 470 475 480	
gcc ttg ctc gac tac tac aac ctg aat gta ggc cgg gac aac ttc gat	1488
Ala Leu Leu Asp Tyr Tyr Asn Leu Asn Val Gly Arg Asp Asn Phe Asp	
485 490 495	
ttc gag gga tcg gaa gac caa aag aac ttt gct gcc tgg cgt gga gag	1536
Phe Glu Gly Ser Glu Asp Gln Lys Asn Phe Ala Ala Trp Arg Gly Glu	
500 505 510	
gtc ttg caa gga gaa gcc aaa tga	1560
Val Leu Gln Gly Glu Ala Lys	
515	

<210> 28
 <211> 519
 <212> PRT
 <213> Burkholderia cepacia

<400> 28

Met Asp Thr Ser Val Gln Lys Lys Leu Gly Leu Lys Asn Arg Tyr
1 5 10 15

Ala Ala Met Thr Arg Gly Leu Gly Trp Gln Thr Ser Tyr Gln Pro Met
20 25 30

Glu Lys Val Phe Pro Tyr Asp Lys Tyr Glu Gly Ile Lys Ile His Asp
35 40 45

Trp Asp Lys Trp Glu Asp Pro Phe Arg Leu Thr Met Asp Ala Tyr Trp
50 55 60

Lys Tyr Gln Gly Glu Lys Glu Lys Leu Tyr Ala Val Ile Asp Ala
65 70 75 80

Phe Ala Gln Asn Asn Gly Gln Leu Ser Ile Ser Asp Ala Arg Tyr Val
85 90 95

Asn Ala Leu Lys Val Phe Ile Gln Gly Val Thr Pro Leu Glu Tyr Met
100 105 110

Ala His Arg Gly Phe Ala His Ile Gly Arg His Phe Thr Gly Glu Gly
115 120 125

Ala Arg Val Ala Cys Gln Met Gln Ser Ile Asp Glu Leu Arg His Phe
130 135 140

Gln Thr Glu Met His Ala Leu Ser His Tyr Asn Lys Tyr Phe Asn Gly
145 150 155 160

Leu His Asn Ser Ile His Trp Tyr Asp Arg Val Trp Tyr Leu Ser Val
165 170 175

Pro Lys Ser Phe Phe Glu Asp Ala Ala Thr Gly Gly Pro Phe Glu Phe
180 185 190

Leu Thr Ala Val Ser Phe Ser Phe Glu Tyr Val Leu Thr Asn Leu Leu
195 200 205

Phe Val Pro Phe Met Ser Gly Ala Ala Tyr Asn Gly Asp Met Ser Thr
 210 215 220
 Val Thr Phe Gly Phe Ser Ala Gln Ser Asp Glu Ser Arg His Met Thr
 225 230 235 240
 Leu Gly Ile Glu Cys Ile Lys Phe Met Leu Glu Gln Asp Pro Asp Asn
 245 250 255
 Val Pro Ile Val Gln Arg Trp Ile Asp Lys Trp Phe Trp Arg Gly Tyr
 260 265 270
 Arg Leu Leu Ser Ile Val Ala Met Met Gln Asp Tyr Met Leu Pro Asn
 275 280 285
 Arg Val Met Ser Trp Arg Glu Ser Trp Glu Met Tyr Val Glu Gln Asn
 290 295 300
 Gly Gly Ala Leu Phe Lys Asp Leu Ala Arg Tyr Gly Ile Arg Lys Pro
 305 310 315 320
 Lys Gly Trp Asp Gln Ala Cys Glu Gly Lys Asp His Ile Ser His Gln
 325 330 335
 Thr Phe Ala Val Phe Tyr Asn Tyr Asn Ala Ala Ala Pro Ile His Thr
 340 345 350
 Trp Val Pro Thr Lys Glu Glu Met Gly Trp Leu Ser Glu Lys Tyr Pro
 355 360 365
 Glu Thr Phe Asp Lys Tyr Tyr Arg Pro Arg Trp Asp Tyr Trp Arg Glu
 370 375 380
 Gln Ala Ala Lys Gly Asn Arg Phe Tyr Asn Lys Thr Leu Pro Met Leu
 385 390 395 400
 Cys Thr Thr Cys Gln Ile Pro Met Ile Phe Thr Glu Pro Gly Asp Ala
 405 410 415
 Thr Lys Ile Cys Tyr Arg Glu Ser Ala Tyr Leu Gly Asp Lys Tyr His
 420 425 430
 Phe Cys Ser Asp His Cys Lys Glu Ile Phe Asp Asn Glu Pro Glu Lys
 435 440 445
 Phe Val Gln Ser Trp Leu Pro Pro Gln Gln Val Tyr Gln Gly Asn Cys
 450 455 460
 Phe Lys Pro Asp Ala Asp Pro Thr Lys Glu Gly Phe Asp Pro Leu Met
 465 470 475 480
 Ala Leu Leu Asp Tyr Tyr Asn Leu Asn Val Gly Arg Asp Asn Phe Asp
 485 490 495
 Phe Glu Gly Ser Glu Asp Gln Lys Asn Phe Ala Ala Trp Arg Gly Glu
 500 505 510
 Val Leu Gln Gly Glu Ala Lys
 515

<210> 29
 <211> 996
 <212> DNA
 <213> Burkholderia cepacia

<220>
 <221> CDS
 <222> (1)..(996)

<400> 29
 atg acc atc gat ttg aag acg cgg gaa atc aaa cca ctg cgt cac acc
 Met Thr Ile Asp Leu Lys Thr Arg Glu Ile Lys Pro Leu Arg His Thr
 1 5 10 15

tac acg cac gtg gct caa tac atc ggg gcc gat aaa gcc gct tcg cgc Tyr Thr His Val Ala Gln Tyr Ile Gly Ala Asp Lys Ala Ala Ser Arg 20 25 30	96
tat cag gaa ggc act gta ggt gct caa ccc gca gcg aat ttt cat tac Tyr Gln Glu Gly Thr Val Gly Ala Gln Pro Ala Ala Asn Phe His Tyr 35 40 45	144
cg ^g ccc acg tgg gat ccc gag cat gaa ctg ttc gac acg tcg cgt acc Arg Pro Thr Trp Asp Pro Glu His Glu Leu Phe Asp Thr Ser Arg Thr 50 55 60	192
gc ^g att caa atg aag gac tgg tat gc ^g ctg aaa gac ccg cgt cag ttc Ala Ile Gln Met Lys Asp Trp Tyr Ala Leu Lys Asp Pro Arg Gln Phe 65 70 75 80	240
tac tac gc ^g tcg tgg acg atg acc cga gc ^g cgg cag caa gac gc ^g atg Tyr Tyr Ala Ser Trp Thr Met Thr Arg Ala Arg Gln Gln Asp Ala Met 85 90 95	288
gaa tcc aac ttc gag ttt gtc gag tcg cgc ggc atg atc gat ctc gtt Glu Ser Asn Phe Glu Phe Val Glu Ser Arg Gly Met Ile Asp Leu Val 100 105 110	336
tcc gat gag gtt cga caa cgg gc ^g ctt tcc gtt ctc gtg cct ttg cgt Ser Asp Glu Val Arg Gln Arg Ala Leu Ser Val Leu Val Pro Leu Arg 115 120 125	384
ca ^c gc ^g gc ^c tgg ggc gc ^g aac atg aac aac tcc cag atc tgt gc ^c cta His Ala Ala Trp Gly Ala Asn Met Asn Asn Ser Gln Ile Cys Ala Leu 130 135 140	432
g ^g t ^g t ^g g ^g ac ^g ac ^c t ^{tc} ac ^t g ^c g ^g g ^c at ^g t ^{tc} c ^{ac} g ^c a ^t g ^{ac} Gly Tyr Gly Thr Thr Phe Thr Ala Pro Ala Met Phe His Ala Met Asp 145 150 155 160	480
a ^{at} ct ^g g ^{gt} g ^{ta} g ^c g ^c a ^g t ^{at} c ^{tc} a ^{ca} c ^{ga} ct ^g g ^c ct ^g g ^{ta} a ^t g ^{tc} Asn Leu Gly Val Ala Gln Tyr Leu Thr Arg Leu Ala Leu Val Met Ser 165 170 175	528
g ^{ga} c ^{cc} g ^{at} c ^{tt} c ^{tt} g ^{ac} g ^{aa} g ^{cc} a ^{ag} c ^{aa} g ^{cc} t ^{gg} a ^t g ^{ac} a ^{gt} c ^{cc} Gly Pro Asp Leu Leu Asp Glu Ala Lys Gln Ala Trp Met Thr Ser Pro 180 185 190	576
g ^{at} t ^{gg} c ^{aa} c ^{cg} t ^{tg} c ^{gt} t ^{at} g ^{tg} g ^{aa} a ^{ac} a ^{ct} c ^{tg} g ^{tg} c ^{tg} c ^{aa} Asp Trp Gln Pro Leu Arg Arg Tyr Val Glu Asn Thr Leu Val Leu Gln 195 200 205	624
g ^{at} c ^{cg} g ^{tg} g ^{aa} c ^{tg} t ^{tc} a ^{tc} g ^{cc} c ^{aa} a ^{at} c ^{tg} g ^c c ^{tc} g ^{ac} g ^{gt} c ^{tt} Asp Pro Val Glu Leu Phe Ile Ala Gln Asn Leu Ala Leu Asp Gly Leu 210 215 220	672
c ^{tt} t ^{at} c ^{cc} a ^{tg} a ^{tc} t ^{ac} g ^{gc} g ^{ct} t ^{tc} g ^{tc} g ^{ac} g ^{at} t ^{ac} a ^{tc} g ^{ca} c ^{tc} Leu Tyr Pro Met Ile Tyr Gly Ala Phe Val Asp Asp Tyr Ile Ala Leu 225 230 235 240	720
a ^{ac} g ^{gt} g ^{gt} a ^{gc} g ^{ca} g ^{tg} g ^{ca} a ^{tg} c ^{ta} a ^{cc} a ^{ct} t ^{tc} a ^{tg} c ^{cc} g ^{ag} t ^{gg} Asn Gly Gly Ser Ala Val Ala Met Leu Thr Thr Phe Met Pro Glu Trp 245 250 255	768
c ^{at} g ^{ac} g ^{aa} t ^{cc} a ^{gt} c ^{gc} t ^{gg} g ^{tc} g ^{at} g ^{cg} g ^{ta} g ^{ta} a ^{ag} a ^{cc} a ^{tg} g ^{cg} His Asp Glu Ser Ser Arg Trp Val Asp Ala Val Val Lys Thr Met Ala 260 265 270	816
a ^{cg} g ^{aa} t ^{cg} g ^{ag} g ^{at} a ^{ac} a ^{aa} g ^{cg} c ^{tg} c ^{tc} a ^{tt} c ^{ac} t ^{gg} t ^{tg} c ^{gt} a ^{cc} Thr Glu Ser Glu Asp Asn Lys Ala Leu Leu Ile His Trp Leu Arg Thr 275 280 285	864
t ^{gg} g ^{aa} g ^{at} c ^{ag} g ^{cg} g ^{cg} t ^{ca} g ^{cg} t ^{tg} t ^{tg} c ^{ct} g ^{tc} g ^{ct} g ^{aa} a ^{tg} g ^{ct} Trp Glu Asp Gln Ala Ala Ser Ala Leu Leu Pro Val Ala Glu Met Ala 290 295 300	912
t ^{tg} g ^{cg} g ^{aa} a ^{ac} g ^{gc} c ^{ac} g ^{ac} g ^{cc} t ^{tg} g ^{aa} g ^{aa} g ^{ta} a ^{gg} c ^{ag} c ^{aa} c ^{tt} Leu Ala Glu Asn Gly His Asp Ala Leu Glu Glu Val Arg Gln Gln Leu 305 310 315 320	960

cgt gcc cgc gtt gcg aag gcc ggg att gtt ctg taa 996
 Arg Ala Arg Val Ala Lys Ala Gly Ile Val Leu
 325 330

<210> 30
 <211> 331
 <212> PRT
 <213> Burkholderia cepacia

<400> 30

Met Thr Ile Asp Leu Lys Thr Arg Glu Ile Lys Pro Leu Arg His Thr
 1 5 10 15

Tyr Thr His Val Ala Gln Tyr Ile Gly Ala Asp Lys Ala Ala Ser Arg
 20 25 30

Tyr Gln Glu Gly Thr Val Gly Ala Gln Pro Ala Ala Asn Phe His Tyr
 35 40 45

Arg Pro Thr Trp Asp Pro Glu His Glu Leu Phe Asp Thr Ser Arg Thr
 50 55 60

Ala Ile Gln Met Lys Asp Trp Tyr Ala Leu Lys Asp Pro Arg Gln Phe
 65 70 75 80

Tyr Tyr Ala Ser Trp Thr Met Thr Arg Ala Arg Gln Gln Asp Ala Met
 85 90 95

Glu Ser Asn Phe Glu Phe Val Glu Ser Arg Gly Met Ile Asp Leu Val
 100 105 110

Ser Asp Glu Val Arg Gln Arg Ala Leu Ser Val Leu Val Pro Leu Arg
 115 120 125

His Ala Ala Trp Gly Ala Asn Met Asn Asn Ser Gln Ile Cys Ala Leu
 130 135 140

Gly Tyr Gly Thr Thr Phe Thr Ala Pro Ala Met Phe His Ala Met Asp
 145 150 155 160

Asn Leu Gly Val Ala Gln Tyr Leu Thr Arg Leu Ala Leu Val Met Ser
 165 170 175

Gly Pro Asp Leu Leu Asp Glu Ala Lys Gln Ala Trp Met Thr Ser Pro
 180 185 190

Asp Trp Gln Pro Leu Arg Arg Tyr Val Glu Asn Thr Leu Val Leu Gln
 195 200 205

Asp Pro Val Glu Leu Phe Ile Ala Gln Asn Leu Ala Leu Asp Gly Leu
 210 215 220

Leu Tyr Pro Met Ile Tyr Gly Ala Phe Val Asp Asp Tyr Ile Ala Leu
 225 230 235 240

Asn Gly Gly Ser Ala Val Ala Met Leu Thr Thr Phe Met Pro Glu Trp
 245 250 255

His Asp Glu Ser Ser Arg Trp Val Asp Ala Val Val Lys Thr Met Ala
 260 265 270

Thr Glu Ser Glu Asp Asn Lys Ala Leu Leu Ile His Trp Leu Arg Thr
 275 280 285

Trp Glu Asp Gln Ala Ala Ser Ala Leu Leu Pro Val Ala Glu Met Ala
 290 295 300

Leu Ala Glu Asn Gly His Asp Ala Leu Glu Glu Val Arg Gln Gln Leu
 305 310 315 320

Arg Ala Arg Val Ala Lys Ala Gly Ile Val Leu
 325 330

<210> 31
 <211> 357
 <212> DNA
 <213> Burkholderia cepacia

<220>
 <221> CDS
 <222> (1)..(357)

<400> 31
 atg agc gtt gtt gcc ctc aaa ccc tac aag ttc ccg gca cga gac gcg 48
 Met Ser Val Val Ala Leu Lys Pro Tyr Lys Phe Pro Ala Arg Asp Ala
 1 5 10 15
 cgc gaa aac ttt ccg gcg ccg ttg ctg ttt atc ggc tgg gaa gac cat 96
 Arg Glu Asn Phe Pro Ala Pro Leu Leu Phe Ile Gly Trp Glu Asp His
 20 25 30
 ctg ttg ttt gcg gca cct gtt gcc ttg ccc ctg ccg tcg gac acg ttg 144
 Leu Leu Phe Ala Ala Pro Val Ala Leu Pro Leu Pro Ser Asp Thr Leu
 35 40 45
 ttc ggt gcg ctg tgc acc cag gtg ttt ccc ggc act tat ggc tat cac 192
 Phe Gly Ala Leu Cys Thr Gln Val Leu Pro Gly Thr Tyr Gly Tyr His
 50 55 60
 ccc gat ttc tca aag atc gac tgg agc cag gtg cag tgg ttt aag tcc 240
 Pro Asp Phe Ser Lys Ile Asp Trp Ser Gln Val Gln Trp Phe Lys Ser
 65 70 75 80
 ggc cag ccg tgg cat ccc gac ccg gcg aag tcg ctg gct gaa aac ggt 288
 Gly Gln Pro Trp His Pro Asp Pro Ala Lys Ser Leu Ala Glu Asn Gly
 85 90 95
 ctg acg cac aaa gac gtg atc cgc ttt cgc acg cct ggc ttg aac ggt 336
 Leu Thr His Lys Asp Val Ile Arg Phe Arg Thr Pro Gly Leu Asn Gly
 100 105 110
 ctg agc ggt tcc tgc aat tga 357
 Leu Ser Gly Ser Cys Asn
 115

<210> 32
 <211> 118
 <212> PRT
 <213> Burkholderia cepacia

<400> 32
 Met Ser Val Val Ala Leu Lys Pro Tyr Lys Phe Pro Ala Arg Asp Ala
 1 5 10 15
 Arg Glu Asn Phe Pro Ala Pro Leu Leu Phe Ile Gly Trp Glu Asp His
 20 25 30
 Leu Leu Phe Ala Ala Pro Val Ala Leu Pro Leu Pro Ser Asp Thr Leu
 35 40 45
 Phe Gly Ala Leu Cys Thr Gln Val Leu Pro Gly Thr Tyr Gly Tyr His
 50 55 60
 Pro Asp Phe Ser Lys Ile Asp Trp Ser Gln Val Gln Trp Phe Lys Ser
 65 70 75 80
 Gly Gln Pro Trp His Pro Asp Pro Ala Lys Ser Leu Ala Glu Asn Gly
 85 90 95
 Leu Thr His Lys Asp Val Ile Arg Phe Arg Thr Pro Gly Leu Asn Gly
 100 105 110
 Leu Ser Gly Ser Cys Asn
 115

<210> 33
 <211> 1143
 <212> DNA
 <213> *Bacillus stearothermophilus*

<220>
 <221> CDS
 <222> (1)..(1143)

<400> 33
 atg gaa aaa aat aaa atg tta ata gaa gaa aag ttg gac act gct gct 48
 Met Glu Lys Asn Lys Met Leu Ile Glu Glu Lys Leu Asp Thr Ala Ala
 1 5 10 15

ctt ctt gct aag gcg gag gaa ata ggc cgg att gct gag gaa gag gcg 96
 Leu Leu Ala Lys Ala Glu Glu Ile Gly Arg Ile Ala Glu Glu Glu Ala
 20 25 30

ggt gaa gcg gac cgc aat gcc tgg ttc tcc gac cgg gtg gct agg gcc 144
 Gly Glu Ala Asp Arg Asn Ala Cys Phe Ser Asp Arg Val Ala Arg Ala
 35 40 45

att aaa gaa gct gga ttc cac aag ctc atg cgt ccc aag cag tac gga 192
 Ile Lys Glu Ala Gly Phe His Lys Leu Met Arg Pro Lys Gln Tyr Gly
 50 55 60

gga ctg caa gta gac ttg cga act tac ggg gag att gtc cgc aca gtg 240
 Gly Leu Gln Val Asp Leu Arg Thr Tyr Gly Glu Ile Val Arg Thr Val
 65 70 75 80

gcc cgg tac agt gtt gcc gca gga tgg ctg acc tat ttt tat tcc atg 288
 Ala Arg Tyr Ser Val Ala Ala Gly Trp Leu Thr Tyr Phe Tyr Ser Met
 85 90 95

cat gag gtt tgg gct gca tat ctg cct cca aaa ggc aga gaa gaa att 336
 His Glu Val Trp Ala Ala Tyr Leu Pro Pro Lys Gly Arg Glu Glu Ile
 100 105 110

ttt gga caa gga ggg ctg ttg gca gac gtc gtt gcc cct gtt ggc cgg 384
 Phe Gly Gln Gly Leu Leu Ala Asp Val Val Ala Pro Val Gly Arg
 115 120 125

gtg gag aag gac ggg gac ggc tac cgt ctc tat ggg cag tgg aac ttc 432
 Val Glu Lys Asp Gly Asp Gly Tyr Arg Leu Tyr Gly Gln Trp Asn Phe
 130 135 140

tgt agc ggt gtc ctc cat agt gac tgg atc gga ctt ggc gcc atg atg 480
 Cys Ser Gly Val Leu His Ser Asp Trp Ile Gly Leu Gly Ala Met Met
 145 150 155 160

gag ctg cct gac ggc aat agt cct gag tac tgg ttt tta gtg ctg cct 528
 Glu Leu Pro Asp Gly Asn Ser Pro Glu Tyr Cys Leu Leu Val Leu Pro
 165 170 175

aag tcg gat gtc cag atc gta gaa aat tgg gat acc atg ggc ctc cgc 576
 Lys Ser Asp Val Gln Ile Val Glu Asn Trp Asp Thr Met Gly Leu Arg
 180 185 190

gct tcg gga agc aac ggg gta tta gtt gaa ggt gct tat gtt cca tta 624
 Ala Ser Gly Ser Asn Gly Val Leu Val Glu Gly Ala Tyr Val Pro Leu
 195 200 205

cac cgg atc ttt ccg gct ggc cgg gtg atg gct cat ccg ctt ttc ttg 672
 His Arg Ile Phe Pro Ala Gly Arg Val Met Ala His Pro Leu Phe Leu
 210 215 220

ctt ggg ttc cct tta gta tct tta ggc ggc gac gaa cga ttg gtg tca 720
 Leu Gly Phe Pro Leu Val Ser Leu Gly Gly Asp Glu Arg Leu Val Ser
 225 230 235 240

ctt ttc caa gaa cgc act gag aag cgc att cgt gtc ttc aaa ggc ggc 768
 Leu Phe Gln Glu Arg Thr Glu Lys Arg Ile Arg Val Phe Lys Gly Gly
 245 250 255

gcg aaa gaa aag gat tct gcc gct agc cag cgg ctg tta gcc gag atg 816

Ala Lys Glu Lys Asp Ser Ala Ala Ser Gln Arg Leu Leu Ala Glu Met
 260 265 270

aaa aca gaa tta aat gca atg gaa ggc att gtg gaa caa tat atc cgc 864
 Lys Thr Glu Leu Asn Ala Met Glu Gly Ile Val Glu Gln Tyr Ile Arg
 275 280 285

cag ctt gag gct tgc caa aaa gaa gga aag acg gtg atg aac gat atg 912
 Gln Leu Glu Ala Cys Gln Lys Glu Gly Lys Thr Val Met Asn Asp Met
 290 295 300

gag cga gag cag cta ttc gca tgg cgt gga tat gtg gca aaa gcg tcc 960
 Glu Arg Glu Gln Leu Phe Ala Trp Arg Gly Tyr Val Ala Lys Ala Ser
 305 310 315 320

gcc aat att gcc gtc aga aca ctg tta act ctt gga ggc aat tcg atc 1008
 Ala Asn Ile Ala Val Arg Thr Leu Leu Thr Leu Gly Gly Asn Ser Ile
 325 330 335

ttt aaa ggc gat ccg gta gaa ctg ttc aca aga gat ttg cta gcg gtg 1056
 Phe Lys Gly Asp Pro Val Glu Leu Phe Thr Arg Asp Leu Leu Ala Val
 340 345 350

gcc gca cat cct aac tcc ctg tgg gag gat gcg atg gct gca tat gga 1104
 Ala Ala His Pro Asn Ser Leu Trp Glu Asp Ala Met Ala Ala Tyr Gly
 355 360 365

aga acg ata ttc ggg ctg cca ggg gac cca gtc tgg taa 1143
 Arg Thr Ile Phe Gly Leu Pro Gly Asp Pro Val Trp
 370 375 380

<210> 34
 <211> 380
 <212> PRT
 <213> *Bacillus stearothermophilus*

<400> 34

Met Glu Lys Asn Lys Met Leu Ile Glu Glu Lys Leu Asp Thr Ala Ala
 1 5 10 15

Leu Leu Ala Lys Ala Glu Glu Ile Gly Arg Ile Ala Glu Glu Glu Ala
 20 25 30

Gly Glu Ala Asp Arg Asn Ala Cys Phe Ser Asp Arg Val Ala Arg Ala
 35 40 45

Ile Lys Glu Ala Gly Phe His Lys Leu Met Arg Pro Lys Gln Tyr Gly
 50 55 60

Gly Leu Gln Val Asp Leu Arg Thr Tyr Gly Glu Ile Val Arg Thr Val
 65 70 75 80

Ala Arg Tyr Ser Val Ala Ala Gly Trp Leu Thr Tyr Phe Tyr Ser Met
 85 90 95

His Glu Val Trp Ala Ala Tyr Leu Pro Pro Lys Gly Arg Glu Glu Ile
 100 105 110

Phe Gly Gln Gly Gly Leu Leu Ala Asp Val Val Ala Pro Val Gly Arg
 115 120 125

Val Glu Lys Asp Gly Asp Gly Tyr Arg Leu Tyr Gly Gln Trp Asn Phe
 130 135 140

Cys Ser Gly Val Leu His Ser Asp Trp Ile Gly Leu Gly Ala Met Met
 145 150 155 160

Glu Leu Pro Asp Gly Asn Ser Pro Glu Tyr Cys Leu Leu Val Leu Pro
 165 170 175

Lys Ser Asp Val Gln Ile Val Glu Asn Trp Asp Thr Met Gly Leu Arg
 180 185 190

Ala Ser Gly Ser Asn Gly Val Leu Val Glu Gly Ala Tyr Val Pro Leu

195

200

205

His Arg Ile Phe Pro Ala Gly Arg Val Met Ala His Pro Leu Phe Leu
 210 215 220

Leu Gly Phe Pro Leu Val Ser Leu Gly Gly Asp Glu Arg Leu Val Ser
 225 230 235 240

Leu Phe Gln Glu Arg Thr Glu Lys Arg Ile Arg Val Phe Lys Gly Gly
 245 250 255

Ala Lys Glu Lys Asp Ser Ala Ala Ser Gln Arg Leu Leu Ala Glu Met
 260 265 270

Lys Thr Glu Leu Asn Ala Met Glu Gly Ile Val Glu Gln Tyr Ile Arg
 275 280 285

Gln Leu Glu Ala Cys Gln Lys Glu Gly Lys Thr Val Met Asn Asp Met
 290 295 300

Glu Arg Glu Gln Leu Phe Ala Trp Arg Gly Tyr Val Ala Lys Ala Ser
 305 310 315 320

Ala Asn Ile Ala Val Arg Thr Leu Leu Thr Leu Gly Gly Asn Ser Ile
 325 330 335

Phe Lys Gly Asp Pro Val Glu Leu Phe Thr Arg Asp Leu Leu Ala Val
 340 345 350

Ala Ala His Pro Asn Ser Leu Trp Glu Asp Ala Met Ala Ala Tyr Gly
 355 360 365

Arg Thr Ile Phe Gly Leu Pro Gly Asp Pro Val Trp
 370 375 380

<210> 35

<211> 1191

<212> DNA

<213> Helianthus annuus

<220>

<221> CDS

<222> (1)..(1191)

<400> 35

atg gcg att cgc atc aat acg gcg acg ttt caa tca gac ctg tac cgt 48
 Met Ala Ile Arg Ile Asn Thr Ala Thr Phe Gln Ser Asp Leu Tyr Arg
 1 5 10 15

tca ttc gcg ttt cct caa ccg aaa cct ctc aga tct ccc aaa ttc gcc 96
 Ser Phe Ala Phe Pro Gln Pro Lys Pro Leu Arg Ser Pro Lys Phe Ala
 20 25 30

atg gct tcc acc att gga tcc gct aca acg aag gtt gaa agc acc aaa 144
 Met Ala Ser Thr Ile Gly Ser Ala Thr Thr Lys Val Glu Ser Thr Lys
 35 40 45

aag ccc ttt acc cct cca agg gag gtt cac caa cag gtg cta cac tca 192
 Lys Pro Phe Thr Pro Arg Glu Val His Gln Gln Val Leu His Ser
 50 55 60

atg ccg cca caa aag atc gaa atc ttc aaa tcc atg gag ggt tgg gcc 240
 Met Pro Pro Gln Lys Ile Glu Ile Phe Lys Ser Met Glu Gly Trp Ala
 65 70 75 80

gaa aat aac ata ttg gtt cac cta aag cct gtc gaa aaa tgc tgg caa 288
 Glu Asn Asn Ile Leu Val His Leu Lys Pro Val Glu Lys Cys Trp Gln
 85 90 95

gca cag gat ttc cta cca gat ccc gca tct gac gga ttt atg gaa caa 336
 Ala Gln Asp Phe Leu Pro Asp Pro Ala Ser Asp Gly Phe Met Glu Gln
 100 105 110

gtg gag gaa tta cgg gct cgg gct aag gag att ccg gat gat tac ttt 384

Val Glu Glu Leu Arg Ala Arg Ala Lys Glu Ile Pro Asp Asp Tyr Phe			
115	120	125	
gtt gtt ttg gtt gga gat atg att act gaa gaa gca ctg cct act tac		432	
Val Val Leu Val Gly Asp Met Ile Thr Glu Glu Ala Leu Pro Thr Tyr			
130	135	140	
caa aca atg ctt aat act ctt gat ggt gtg cgt gat gag acc ggg gct		480	
Gln Thr Met Leu Asn Thr Leu Asp Gly Val Arg Asp Glu Thr Gly Ala			
145	150	155	160
acc cta ctt ctt ggg cta gtc tgg act cgg gct tgg acc gct gaa gaa		528	
Thr Leu Leu Leu Gly Leu Val Trp Thr Arg Ala Trp Thr Ala Glu Glu			
165	170	175	
aac agg cac ggt gat ctt cta cat cag tat ctg tat ctt agt ggg cgg		576	
Asn Arg His Gly Asp Leu Leu His Gln Tyr Leu Tyr Leu Ser Gly Arg			
180	185	190	
gtc gac atg agg cag att cag aag aca att cag tac ctc att ggg tct		624	
Val Asp Met Arg Gln Ile Gln Lys Thr Ile Gln Tyr Leu Ile Gly Ser			
195	200	205	
gga atg gac ccc cgg acc gaa aac agt cct tac ctt ggg ttc atc tac		672	
Gly Met Asp Pro Arg Thr Glu Asn Ser Pro Tyr Leu Gly Phe Ile Tyr			
210	215	220	
act tca ttt caa gag cgt gcc acc ttc atc tct cac gga aac aca gcc		720	
Thr Ser Phe Gln Glu Arg Ala Thr Phe Ile Ser His Gly Asn Thr Ala			
225	230	235	240
cgg cac gca aag gag cat ggt gac gtg aag ctg gct caa atg tgc ggt		768	
Arg His Ala Lys Glu His Gly Asp Val Lys Leu Ala Gln Met Cys Gly			
245	250	255	
ata att gca gct gat gaa aaa agg cac gaa acc gcc tac aca aaa ata		816	
Ile Ile Ala Ala Asp Glu Lys Arg His Glu Thr Ala Tyr Thr Lys Ile			
260	265	270	
gta gaa aaa ctc ttc gaa att gac ccg gac ggc act gtt ctc gct ttt		864	
Val Glu Lys Leu Phe Glu Ile Asp Pro Asp Gly Thr Val Leu Ala Phe			
275	280	285	
gcc gac atg atg agg aaa aag atc tcc atg cct gca cac ttg atg tac		912	
Ala Asp Met Met Arg Lys Lys Ile Ser Met Pro Ala His Leu Met Tyr			
290	295	300	
gat ggg cgt gat gat aac ctc ttc gaa aat ttc tca gct gtt gcc caa		960	
Asp Gly Arg Asp Asp Asn Leu Phe Glu Asn Phe Ser Ala Val Ala Gln			
305	310	315	320
agg ctc ggt gtg tac act gcg aag gac tat gca gac att ctg gag ttt		1008	
Arg Leu Gly Val Tyr Thr Ala Lys Asp Tyr Ala Asp Ile Leu Glu Phe			
325	330	335	
ctg gtg ggc cgg tgg aag gtg gcg gat tta acc ggg ctt tct ggt gaa		1056	
Leu Val Gly Arg Trp Lys Val Ala Asp Leu Thr Gly Leu Ser Gly Glu			
340	345	350	
ggg cgt aaa gcc caa gac tat gtg tgc ggg ctg gcc cca aga atc aga		1104	
Gly Arg Lys Ala Gln Asp Tyr Val Cys Gly Leu Ala Pro Arg Ile Arg			
355	360	365	
agg ctt gag gag agg aac tcg gca agg gcg aag gaa agt gtg aac gtt		1152	
Arg Leu Glu Arg Asn Ser Ala Arg Ala Lys Glu Ser Val Asn Val			
370	375	380	
ccg ttc agc tgg atc ttt gat aga gaa gtg aag ctc tga		1191	
Pro Phe Ser Trp Ile Phe Asp Arg Glu Val Lys Leu			
385	390	395	
<210> 36			
<211> 396			
<212> PRT			
<213> Helianthus annuus			

<400> 36

Met Ala Ile Arg Ile Asn Thr Ala Thr Phe Gln Ser Asp Leu Tyr Arg
 1 5 10 15

Ser Phe Ala Phe Pro Gln Pro Lys Pro Leu Arg Ser Pro Lys Phe Ala
 20 25 30

Met Ala Ser Thr Ile Gly Ser Ala Thr Thr Lys Val Glu Ser Thr Lys
 35 40 45

Lys Pro Phe Thr Pro Pro Arg Glu Val His Gln Gln Val Leu His Ser
 50 55 60

Met Pro Pro Gln Lys Ile Glu Ile Phe Lys Ser Met Glu Gly Trp Ala
 65 70 75 80

Glu Asn Asn Ile Leu Val His Leu Lys Pro Val Glu Lys Cys Trp Gln
 85 90 95

Ala Gln Asp Phe Leu Pro Asp Pro Ala Ser Asp Gly Phe Met Glu Gln
 100 105 110

Val Glu Glu Leu Arg Ala Arg Ala Lys Glu Ile Pro Asp Asp Tyr Phe
 115 120 125

Val Val Leu Val Gly Asp Met Ile Thr Glu Glu Ala Leu Pro Thr Tyr
 130 135 140

Gln Thr Met Leu Asn Thr Leu Asp Gly Val Arg Asp Glu Thr Gly Ala
 145 150 155 160

Thr Leu Leu Leu Gly Leu Val Trp Thr Arg Ala Trp Thr Ala Glu Glu
 165 170 175

Asn Arg His Gly Asp Leu Leu His Gln Tyr Leu Tyr Leu Ser Gly Arg
 180 185 190

Val Asp Met Arg Gln Ile Gln Lys Thr Ile Gln Tyr Leu Ile Gly Ser
 195 200 205

Gly Met Asp Pro Arg Thr Glu Asn Ser Pro Tyr Leu Gly Phe Ile Tyr
 210 215 220

Thr Ser Phe Gln Glu Arg Ala Thr Phe Ile Ser His Gly Asn Thr Ala
 225 230 235 240

Arg His Ala Lys Glu His Gly Asp Val Lys Leu Ala Gln Met Cys Gly
 245 250 255

Ile Ile Ala Ala Asp Glu Lys Arg His Glu Thr Ala Tyr Thr Lys Ile
 260 265 270

Val Glu Lys Leu Phe Glu Ile Asp Pro Asp Gly Thr Val Leu Ala Phe
 275 280 285

Ala Asp Met Met Arg Lys Lys Ile Ser Met Pro Ala His Leu Met Tyr
 290 295 300

Asp Gly Arg Asp Asp Asn Leu Phe Glu Asn Phe Ser Ala Val Ala Gln
 305 310 315 320

Arg Leu Gly Val Tyr Thr Ala Lys Asp Tyr Ala Asp Ile Leu Glu Phe
 325 330 335

Leu Val Gly Arg Trp Lys Val Ala Asp Leu Thr Gly Leu Ser Gly Glu
 340 345 350

Gly Arg Lys Ala Gln Asp Tyr Val Cys Gly Leu Ala Pro Arg Ile Arg
 355 360 365

Arg Leu Glu Glu Arg Asn Ser Ala Arg Ala Lys Glu Ser Val Asn Val
 370 375 380

Pro Phe Ser Trp Ile Phe Asp Arg Glu Val Lys Leu
 385 390 395